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# BETTER FRUIT

VOLUME VI                      DECEMBER, 1911                      NUMBER 6

## PRUNING AND PLANTING EDITION



MOUNT McLOUGHLIN (FORMERLY MOUNT PITT) FROM A POINT NEAR MEDFORD  
This majestic mountain rises to a height of 9760 feet and  
dominates the landscape for many miles

BETTER FRUIT PUBLISHING COMPANY, PUBLISHERS, HOOD RIVER, OREGON

Subscription \$1.00 per Year in the United States and Canada; Foreign, Including Postage, \$1.50                      Single Copy 10 Cents



Dangerous Fruit Pests are Unknown  
in the famous

# BitterRootValley

on Montana's Pacific Slope  
Where the Wormless Apples Grow

## Smudging Is Unnecessary

There has not been a killing frost on the bench lands in the growing season in the history of the Valley. There are no dust storms.

Pure water and sunshine 300 days in the year make ideal health conditions.

Net profits annually range from \$2,000 to \$5,000

on a matured apple orchard of only ten acres.

Undeveloped land in this remarkable fruit district can still be bought for less money than is asked in other valleys less perfectly adapted by nature for successful fruit growing. Values now range from \$250 to \$350 per acre.

Developed tracts of ten acres, with contract to cultivate and care for same to five-year maturity, cost only \$5,000 if purchased now. Easy terms of payment for both developed and undeveloped land.

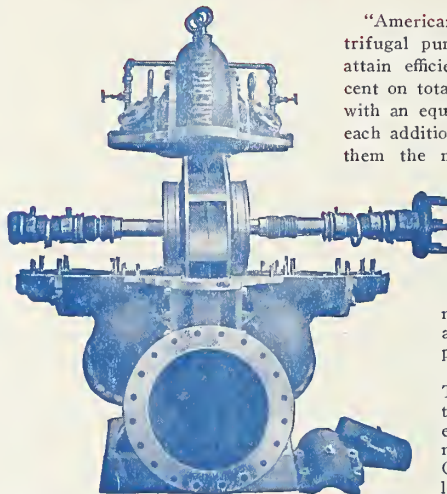
Detailed information upon request.

## Bitter Root Valley Irrigation Co.

First National Bank Building, CHICAGO

All the Grand Prizes and All the Gold Medals  
Given by the Alaska-Yukon-Pacific Exposition at Seattle  
in 1909 to pumps were awarded to

## "AMERICAN" PUMPING MACHINERY



"American" single stage centrifugal pumps are guaranteed to attain efficiencies of 60 to 80 per cent on total heads up to 125 feet, with an equal increase in head for each additional stage, which makes them the most economical pump made for irrigation purposes.

"American" centrifugals are made in both horizontal and vertical styles, in any size, in any number of stages, and are equipped with any power.

Write for "Efficiency Tests of American Centrifugals," by the most eminent hydraulic engineer on the Pacific Coast. Complete catalogue, No. 104, free.

## The American Well Works

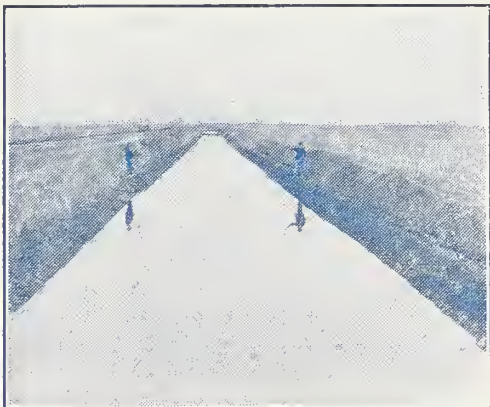
General Office and Works: Aurora, Illinois, U. S. A.  
Chicago Office: First National Bank Building

### PACIFIC COAST SALES AGENCIES:

70 FREMONT STREET, SAN FRANCISCO  
341 SOUTH LOS ANGELES STREET, LOS ANGELES  
SECOND AND ASH STREETS, PORTLAND, OREGON  
1246 FIRST AVENUE SOUTH, SEATTLE  
305 COLUMBIA BUILDING, SPOKANE

# THE GRAVITY IRRIGATION SYSTEM OF THE SPOKANE VALLEY

Has developed the greatest apple and berry district of the West. Nearness to market causes larger net returns than in any other locality. Seventy-two trains daily through the valley. Every modern convenience. "Life's journey is swift; let us live by the way." The Spokane Valley has the unique distinction of being the only established apple district near a big city. Think what that means and investigate. Five thousand contented settlers.



THE BEST  
IRRIGATION  
SYSTEM  
IN THE  
WEST



HOMES AND SCHOOL IN THE  
SPOKANE VALLEY

## SPOKANE VALLEY IRRIGATED LAND CO.

401 SPRAGUE AVENUE, SPOKANE, WASHINGTON



# Hood River and Hood River Valley at the Close of 1911

In Hood River numerous and important improvements are under way. The system of city water supply heretofore owned and operated by a private corporation has been purchased by the municipality. Additional mains are being laid preparatory to connecting with a new source of supply of ample volume and unquestioned purity in a spring six miles out towards Mount Hood. This will furnish abundant water of a quality equal to that of the famous Bull Run water of Portland, the head of the stream in each case being among the glaciers and snows of Mount Hood. New lines of sewers are being put down and old lines extended. Upwards of fifty blocks of cement walk have been laid during the year, and the streets of the business district, about twenty blocks in extent, having been graded, will next spring be paved in cement over a base of crushed rock.

A new passenger station of brick and cement, heated by steam, lighted throughout by electricity, and costing \$30,000, was built during the summer by the Oregon-Washington Railroad & Navigation Company and occupied in September. Two brick business blocks, 50x100 and 100x100, are now in course of erection, for use as store-rooms and apartments. There is also building a church edifice for the Congregational Society of Hood River. The walls are constructed of the blue stone of the Valley. A park has been set aside as a site for a public library, and arrangements are now in progress for a building and equipment to cost \$20,000.

The present population of Hood River City is 2,500; the capital of its three banks, \$225,000, with surplus and undivided profits of \$50,000 and deposits of over \$1,000,000. In 1900, when there was but one bank, the deposits were \$36,000.

In the Valley eight miles of macadam roadway have been built, with as much more projected for next year, which will make possible a fine automobile spin "around the loop," and connecting later on with the wagon road now building over the sixty-six miles of mountain distance between Portland and Hood River, will make a scenic drive of unsurpassed grandeur and beauty. New homes—the bungalow, where cozy comfort dwells, and the spacious house, wherein all modern improvements contribute to luxurious ease—brighten the landscape in divers places.

Bearing orchards indicate by their fruit spurs a crop of upwards of a million boxes for 1912; "the planting of the apple tree" goes on with unabated vigor, and important sales of both uncleared and developed land attest the faith of investors.

## HOOD RIVER COMMERCIAL CLUB

*Anace G. Kauffman*

*Secretary.*

IF YOU WANT TO MARKET  
YOUR

**FRUIT**

RIGHT

ALWAYS SHIP TO

**W. B. GLAFKE CO.**

WHOLESALE FRUITS  
AND PRODUCE

108-110 Front Street  
PORTLAND, OREGON

W. H. DRYER

W. W. BOLLAM

**Dryer, Bollam & Co.**

GENERAL  
COMMISSION MERCHANTS

128 FRONT STREET

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**LEVY & SPIEGL**

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FRUITS AND PRODUCE

Commission Merchants

SOLICIT YOUR CONSIGNMENTS

Top Prices and Prompt Returns  
PORTLAND, OREGON

*Correspondence Solicited*

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BUTTE, MONTANA

*Branch Houses:*  
Livingston, Bozeman, Billings  
Montana  
Pocatello, Idaho  
Salt Lake City, Utah

Wholesale Fruit and Produce

WE HAVE MODERN COLD STORAGE FACILITIES  
ESSENTIAL FOR HANDLING YOUR PRODUCTS  
*A strong house that gives reliable market  
reports and prompt cash returns*

The Old Reliable

**BELL & CO.**

Incorporated

WHOLESALE

**FRUITS AND PRODUCE**

112-114 Front Street  
PORTLAND, OREGON

**Richey & Gilbert Co.**

H. M. GILBERT, *President and Manager*

Growers and Shippers of

**YAKIMA VALLEY FRUITS  
AND PRODUCE**

Specialties: Apples, Peaches,  
Pears and Cantaloupes

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DOCTOR OF OPHTHALMOLOGY

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TESTED



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GROUND

Over 30 Years' Experience

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Magnifiers to examine scale

Hood River Oregon and Glenwood Iowa

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**Wholesale Fruits**

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200 WASHINGTON ST.

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COMMISSION MERCHANTS

Wholesale Fruits and Produce

We make a specialty  
in Fancy Apples, Pears and  
Strawberries

130 Front Street, Portland, Oregon

**SGOBEL & DAY**

ESTABLISHED 1869

235-238 West Street

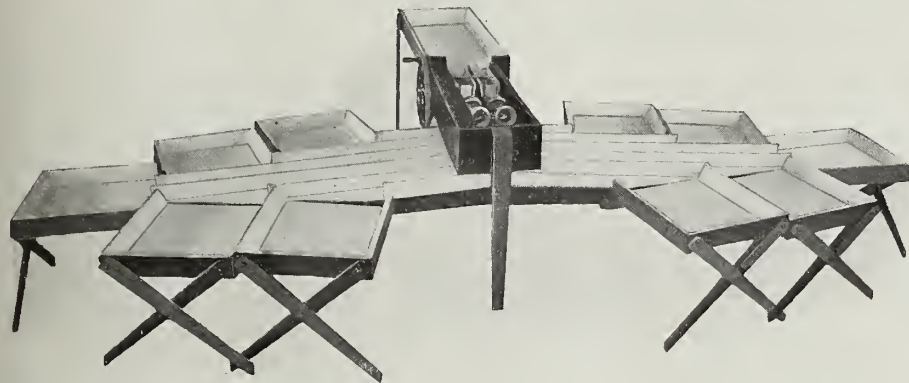
NEW YORK

Strictly commission house. Specialists in  
Apples Pears and Prunes. Exporters of  
Newtown Pippins to their own represen-  
tatives in England.

**QUALITY  
QUALITY  
QUALITY**



# An Unqualified Success



IT HAS GIVEN EVERY  
PURCHASER ENTIRE  
SATISFACTION

Our first machine was sold to the owner of the finest orchard in the New England states. He writes:

Fitchburg, Mass.  
October 3, 1911

Schellenger Fruit Grading  
Machine Co.

Dear Sirs — We have run your apple grader this year and it certainly has done fine work, relieving us entirely of the hard tedious work of the apple business—grading the fruit by hand.

Success to you.

(Signed) A. A. MARSHALL

Results this machine obtained for the growers  
in handling their 1911 crops

First—Reduced cost of packing

Second—Improved the quality and uniformity of the pack

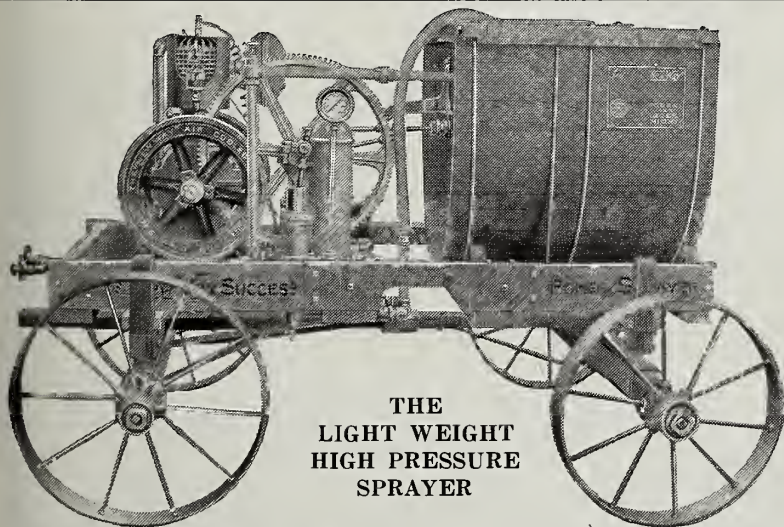
Third—Solved the labor problem

## Schellenger Fruit Grading Machine Co.

INCORPORATED

Our references { First, Our Customers  
Secondly, Our Bank

633-635 South Fourth West Street, Salt Lake City, Utah



THE  
LIGHT WEIGHT  
HIGH PRESSURE  
SPRAYER

# \$1,000 CARLOAD PRIZE

of 630 boxes apples at National  
Apple Show were sprayed with

## *THE "New-Way"*

HIGH PRESSURE POWER SPRAYER

You can do this with your orchard  
with *THE "New-Way"*

TWIN CYLINDER "SUCCESS"

200 LBS. PRESSURE constantly all day long does the work. The "SUCCESS" is built to give this high pressure for many years.

THE ENGINE IS THE MOST IMPORTANT part of the sprayer. The "NEW WAY" AIR COOLED, is a farm engine for every day in the year and can be removed from platform in a few minutes. Ordinary sprayer engines are simply little toys that will only pump water.

SPRAYING IS DONE WITH A RUSH while good weather lasts. The "SUCCESS" is a light-weight outfit that permits rapid all day work anywhere, on hill side, uneven or ploughed land. Rapid work is what counts. Heavy outfits are too clumsy to move around.

TWIN CYLINDER PUMP GIVES steady pressure. Cylinders cast separate and fitted with bronze pistons with outside packing. The "SUCCESS" will give high pressure for years, where ordinary outfits play out after the first or second season.

Write to our nearest office today for our sprayer catalog No. S2.

***THE "New-Way" MOTOR COMPANY***  
LANSING, MICHIGAN, U.S.A.

OR **John Deere Plow Co.** Portland, Spokane  
San Francisco



# TREES APPLE, CHERRY TREES PEAR, PEACH

**MILTON NURSERY COMPANY**

A. MILLER & SONS, Inc.

You cannot afford to take a chance in buying trees to plant for future profit. It requires knowledge, experience and equipment to grow reliable nursery stock.

**OUR 33 YEARS' EXPERIENCE** in growing first-class trees, true to name, for commercial orchards, insures our customers against any risk as to quality and genuineness of stock.

Orders are now being booked for fall delivery 1911. Catalog and price list free for the asking.

Address all communications to

**MILTON NURSERY COMPANY, Milton, Oregon**

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**Office Supplies  
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## SEATTLE

Increased 194 per cent in population, according to Uncle Sam's last census. This is more than any other large city in the PACIFIC NORTHWEST.

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Leads all states of the Union in growth, having increased 120.4 per cent, according to the same authority. If you want accurate information about Seattle and Washington, subscribe for

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140 VARIETIES ANY QUANTITY

Plenty of stock in our 40,000 pounds  
Growing Plants as season requires

All makes high grade

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International Stock and

Poultry Food

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Incubators and Brooders

Everything for Building

Everything for Furnishing

**Stewart Hardware & Furniture Co.**

Hood River, Oregon

22,000 feet floor space

# Spitzenbergs and Newtowns

**FROM THE  
Hood River Valley  
Oregon**

Took the first prize on carload entry at the Third National Apple Show, Spokane, Washington, and Chicago, Illinois, 1910.

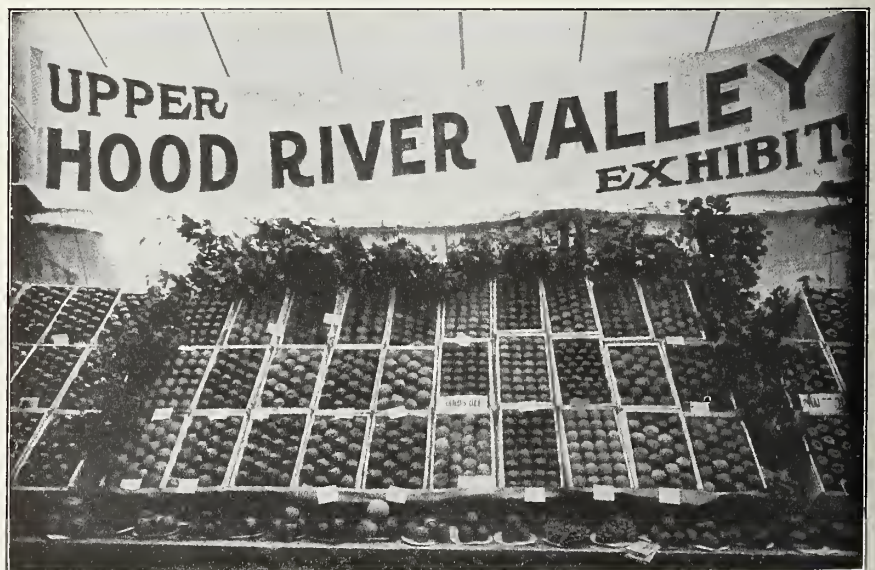
The Spitzenberg car scored, out of a possible 1,000 points, 997. The Newtown car, out of a possible 990 points, scored 988.

The Spitzenberg carload also won the championship carload prize at this show.

## Can You Beat It?

We have got land improved and unimproved that is growing such fruit and that can grow it.

We are agents for the Mount Hood Railroad Company's logged off lands in Upper Hood River Valley. Many started in a small way; today they are independent. You can begin today. It pays to see us. Send today for large list of Hood River orchard land, improved and unimproved, and handsome illustrated booklet.



The above picture shows a prize-winning exhibit of Upper Hood River Valley apples at the Hood River Apple Show

**W. J. BAKER & COMPANY**

**HOOD RIVER, OREGON**

The oldest real estate firm in Hood River

Best apple land our specialty



# WE WANT TO TALK BUSINESS

WITH EVERY SHIPPER OF

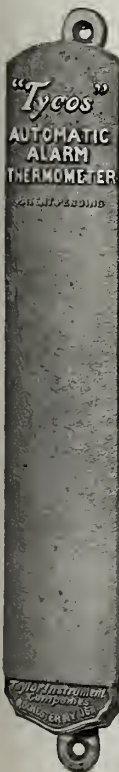
# APPLES PEACHES PEARS

IN

California, Oregon, Washington, Idaho, Colorado, Utah, Nevada

WRITE US TO-DAY, stating varieties, quantity and probable quality of fruit you expect to ship. Look up our standing; ask "Better Fruit" or your bank

**Robt. T. Cochran & Co.** 290 Washington Street  
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## No Danger from Frosts to Your Crops and Fruits

if you have a "Tycos" Alarm Thermometer installed. It saves the expense and labor of having your heating or "smudging" device running at unnecessary times, and warns you with certainty of approaching frost. It is indispensable to the orchardist and fruit grower. It pays for itself every year if there is no frost, and may pay for itself a hundred times over by giving the "frost alarm" when danger is least expected.

### A "Tycos" ALARM THERMOMETER [Rings Warning in Your Ears]

at just the right time. The bell can be located anywhere desired. It rings when the temperature reaches the point of danger—the "frost alarm" flashes over the wires from the place where the thermometer is located.

When you buy any kind of a thermometer always look for the name "Tycos"—there's a "Tycos" thermometer for every purpose. The name is your protection and our guarantee. Write for booklets, "Thermometer Facts," "Tycos Tips for Butter Makers," "The Thermometer Book," etc.

The entire system is so simple that anyone can install it. That it is made for lasting, reliable service is guaranteed by the name "Tycos," which means on a thermometer instrument what the eagle means on a dollar.

The "Tycos" Automatic Alarm Thermometer may be installed in Single Alarm Thermometers or Annunciator Connection Systems. If your dealer can't supply you, write us.

We will mail you free our booklet showing diagrams of the systems, which explain with simplicity the installation and operation of the "Tycos" Automatic Alarm Thermometer.

WRITE TODAY FOR IT

Taylor Instrument Companies

105 Ames St., Rochester, N. Y.

"Where the Thermometers come from"



## This Light Weight Grader Will Solve Your Irrigation Problems

It is an all-steel one-man machine. It weighs only 600 pounds. It will stir your soil, level your land, cut laterals, pick up dirt and drop it where you want it, and cut ditches 24 to 36 inches deep at a cost of 2 cents a rod. It will do more work than big heavy graders in less time and with less effort. One man with two horses operates it. Ditches cut with the 20th Century Grader are "V" shaped, with firm, solid sides—no fear of their being washed down.

## 20th Century Grader

is a many purpose, easily operated machine that pays for itself over and over again and puts money into your pocket.

To get big results your work must be right, so you must have the right machine.

Let us tell you what others say about this wonderful machine. We want to prove to your satisfaction that it's a genuine money-maker. There are many uses to which the 20th Century Grader is specially adapted and many ways you can make big money by using it on your ownland and on your neighbors'.

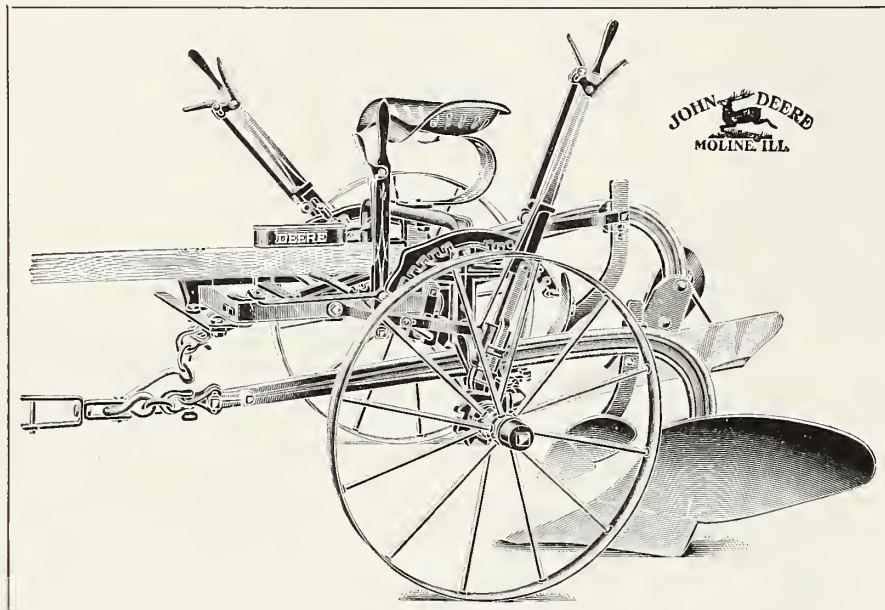
Write for our interesting and valuable free book giving full information about this money-making machine, what it has done for thousands and will do for you.



THE BAKER MANUFACTURING CO.

542 Hunter Building  
CHICAGO, ILLINOIS

# The John Deere Two Way Sulky Plow



Adapted to  
Irrigated or Hilly  
Sections

Throws the furrow all one way—no back furrow, no dead furrow—no ridging of the land. Furnished with either Steel or Cast Bottoms

Write for  
*Illustrated Circular*

**JOHN DEERE PLOW CO. OF PORTLAND, OREGON**

PORTLAND

SPOKANE

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## TERMINAL ICE AND COLD STORAGE CO.

A COLD STORAGE PLANT, MODERN THROUGHOUT, AT  
THIRD AND HOYT STREETS, PORTLAND, OREGON

Fruit growers or apple growers and dealers of the Western markets in and around Portland, who have watched the markets closely for the past few years, have learned that in the spring there is always a good demand for apples, and that they usually bring good prices if they are in good condition. There is only one way to keep them in good condition for spring consumption, and that is to put them in cold storage.

We offer the best of cold storage facilities in the city of Portland and solicit correspondence from all the associations and fruit growers in general who want to store fruit in the fall or early winter to be used in the spring.

Write us and we will give you further particulars.

## TERMINAL ICE AND COLD STORAGE CO.

THIRD AND HOYT STREETS, PORTLAND, OREGON

## WOULDN'T YOU

Like to move to a new country if it was not  
for the PIONEERING?

## OPPORTUNITY

Is a new fruit district (under irrigation five years) but three miles from the city of Spokane in the famous Spokane valley. All our tracts have electric lights, domestic water, telephones, in fact every modern convenience. Large profits and an ideal home.

Get particulars from **OPPORTUNITY-VERA LAND CO.**  
403 Sprague Avenue, Spokane, Washington

The American Express Company, in connection with the National Express Company, having named exceptional rates on apples, we will deliver to any point in the United States or Canada where the American Express or the National Express Company has an office

ONE OF OUR WELL KNOWN SEVENTEEN POUND BOXES OF

## Extra Fancy Hood River Apples

AT FOLLOWING PRICES, ALL CHARGES PREPAID (excepting duty charges)

Spitzenbergs, \$2.25; Newtowns, \$2.25; Ortleys, \$2.25; Winter Bananas, \$2.50

Express Money Order, Check or Cash should accompany all orders. To points beyond the American or National Express lines 30 cents should be added to cover additional express charges

None but Extra Fancy Apples  
shipped in these packages

**Crocker & de Reding, Hood River, Oregon**



# Our Unparalleled Clubbing Offer

“Better Fruit” offers to its readers what it considers the finest list of clubbing offers ever placed before the public in the Northwest. Its variety is one that must appeal to readers of all classes. Look it over carefully, select the one you want and send us the proper amount and we will do the rest.

The Ladies' World.....\$ .50 Modern Priscilla ..... .75 "Better Fruit" ..... 1.00  Total .....\$2.25 All for ..... 1.85	The Etude .....\$1.50 "Better Fruit" ..... 1.00  Total .....\$2.50 Both for ..... 2.00	Pacific Monthly .....\$1.50 "Better Fruit" ..... 1.00  Total .....\$2.50 Both for ..... 1.75	Woman's Home Companion.\$1.50 McClure's ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$4.00 All for ..... 3.00
Garden Magazine .....\$1.50 American Magazine ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$4.00 All for ..... 2.90	American Bee Journal.....\$1.00 "Better Fruit" ..... 1.00  Total .....\$2.00 Both for ..... 1.65	Success and National Post..\$1.00 American Magazine ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$3.50 All for ..... 2.70	Weekly Oregonian .....\$1.50 "Better Fruit" ..... 1.00  Total .....\$2.50 Both for ..... 1.75
Delineator .....\$1.50 Good Housekeeping ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$4.00 All for ..... 2.75	Review of Reviews.....\$3.00 Scribner's ..... 3.00 Good Housekeeping ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$8.50 All for ..... 6.00	Delineator .....\$1.50 Success and National Post.. 1.00 Everybody's ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$5.00 All for ..... 3.60	Sunset .....\$1.50 "Better Fruit" ..... 1.00  Total .....\$2.50 Both for ..... 1.90
Scientific American .....\$3.00 "Better Fruit" ..... 1.00  Total .....\$4.00 Both for ..... 3.50	Everybody's .....\$1.50 American Magazine ..... 1.50 Delineator ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$5.50 All for ..... 3.90	Good Housekeeping .....\$1.50 Success and National Post.. 1.00 American ..... 1.50 Cosmopolitan ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$6.50 All for ..... 4.40	Everybody's .....\$1.50 St. Nicholas ..... 3.00 "Better Fruit" ..... 1.00  Total .....\$5.50 All for ..... 4.50
Fruit Grower (St. Joseph)..\$1.00 "Better Fruit" ..... 1.00  Total .....\$2.00 Both for ..... 1.50	Housekeeper .....\$1.50 Review of Reviews..... 3.00 McClure's ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$7.00 All for ..... 4.50	Century .....\$4.00 Everybody's ..... 1.50 World's Work ..... 3.00 "Better Fruit" ..... 1.00  Total .....\$9.50 All for ..... 6.60	Breeders' Gazette .....\$1.75 "Better Fruit" ..... 1.00  Total .....\$2.75 Both for ..... 2.00
The Ladies' World.....\$ .50 Pictorial Review ..... 1.00 Modern Priscilla ..... .75 "Better Fruit" ..... 1.00  Total .....\$3.25 All for ..... 2.15	Country Life in America....\$4.00 Review of Reviews..... 3.00 McClure's ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$9.50 All for ..... 6.75	Country Life in America....\$4.00 World's Work ..... 3.00 Everybody's ..... 1.50 Delineator ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$11.00 All for ..... 7.75	Northwest Poultry Journal..\$.50 "Better Fruit" ..... 1.00  Total .....\$1.50 Both for ..... 1.25
Good Housekeeping .....\$1.50 Cosmopolitan ..... 1.50 World Today ..... 3.00 "Better Fruit" ..... 1.00  Total .....\$7.00 All for ..... 3.70	Country Life in America....\$4.00 Outing ..... 3.00 "Better Fruit" ..... 1.00  Total .....\$8.00 All for ..... 6.25	Kansas City Weekly Star...\$.25 "Better Fruit" ..... 1.00  Total .....\$1.25 Both for ..... 1.00	World's Work .....\$3.00 Everybody's ..... 1.50 Delineator ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$7.00 All for ..... 4.50
Review of Reviews.....\$3.00 McClure's ..... 1.50 Scribner's ..... 3.00 "Better Fruit" ..... 1.00  Total .....\$8.50 All for ..... 6.15	Review of Reviews.....\$3.00 Woman's Home Companion. 1.50 McClure's ..... 1.50 "Better Fruit" ..... 1.00  Total .....\$7.00 All for ..... 4.50	Woman's Home Companion.\$1.50 "Better Fruit" ..... 1.00  Total .....\$2.50 Both for ..... \$1.80	Garden Magazine .....\$1.50 "Better Fruit" ..... 1.00  Total .....\$2.50 Both for ..... 1.90
			Good Housekeeping .....\$1.50 Pictorial Review ..... 1.00 "Better Fruit" ..... 1.00  Total .....\$3.50 All for ..... 2.50

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Superior facilities for handling

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APPLES AND  
PEARS**

Solicit Your Consignments

Reliable Market Reports Prompt Cash Returns

**YAKIMA COUNTY  
HORTICULTURAL UNION**

North Yakima, Washington

C. R. Paddock, Manager

Apples, Pears, Peaches, Cherries  
Plums, Prunes, Apricots, Grapes  
and Cantaloupes

Mixed carloads start about  
July 20. Straight carloads in  
season. Our fruit is the very  
best grade; pack guaranteed

We use Revised Economy Code

**Why Bother with  
Irrigation?**

ASK

**PHOENIX LUMBER CO.**  
SPOKANE, WASH.

ABOUT

**Cut Over Lands**

YOU CAN BUY CHEAP

W. E. BIGALOW, President

Capital and Surplus \$100,000.00  
Established 1883

H. J. BIGALOW, Secretary and Treasurer

REFERENCES:

The First National Bank, Cleveland

All Commercial Agencies

The Produce Reporter Company

Any reliable house in our line in the  
United States

*Commission  
Merchants*



*SOME OF OUR SHIPPERS—REFERENCES*  
California Growers' Exchange, Los Angeles, Cal.  
California Fruit Distributors.  
Earl Fruit Company.  
Pioneer Fruit Company.  
Producers' Fruit Company, Sacramento, Cal.  
Stewart Fruit Company, Los Angeles, Cal.  
Atwood Grape Fruit Company, Manavista, Fla.  
Florida Citrus Exchange, Tampa, Fla.  
W. G. Martin, Castleberry, Ala.  
Sylvester Fruit Co., Sylvester, Ga.  
Gibson Fruit Co., Chicago, Ill.  
Mills Bros., Chicago, Ill.

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Wholesalers*

CLEVELAND, OHIO

*Apples, Plums, Prunes, Pears,  
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We have the largest and best trade in the Cleveland territory; our facilities are unsurpassed  
We have had years of experience in handling box apples and fancy fruits

We solicit your correspondence and shipments

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OF

**BOX APPLES**

**Box Pears Box Peaches**

Largest handlers of box fruit in this  
territory. Best modern storage facilities.  
Reliable market reports.

Top Prices  
Prompt Returns

**E. H. SHAFER & CO.**  
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**SOUTHERN OREGON NURSERIES**

YONCALLA, OREGON

No Agents  
Prices Wholesale

**GENERAL NURSERY STOCK PROPAGATORS**

Stock clean and true. Budded or  
grafted from bearing trees

**E. P. DREW**  
Consulting Horticulturist

30 years in business

**The PARIS FAIR**

Hood River's largest and best store

Retailers of

**EVERYTHING TO WEAR**

Agents for

**HAMILTON & BROWN AND  
THE BROWN SHOES**

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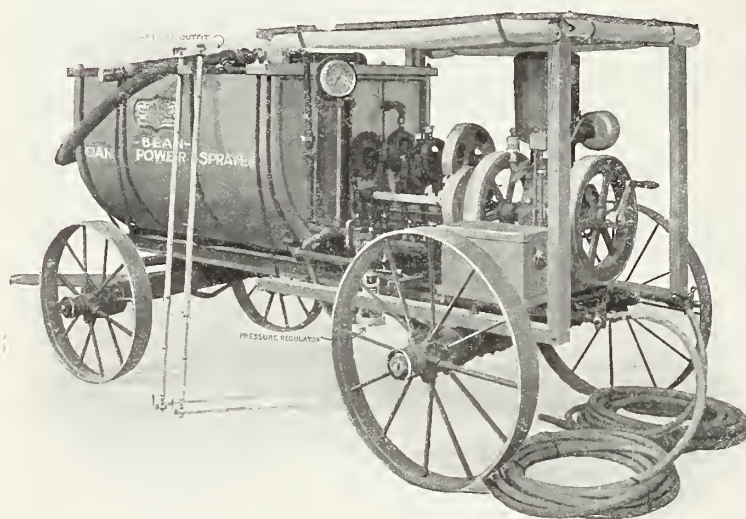
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AN ILLUSTRATED MAGAZINE PUBLISHED MONTHLY IN THE INTEREST OF MODERN, PROGRESSIVE FRUIT GROWING AND MARKETING

## Pruning, or the Training of Fruit Trees

By E. N. Benson, Hood River, Oregon

**P**RUNING is the most important work in orchard culture and one the least understood by many of the growers. The first important thing to be considered in the starting of a young orchard should be the system of pruning, of which there are two distinct types. One being the open-headed and the other the center-shoot system. They both have their advantages and disadvantages as well, though personally I prefer the center-shoot system, hence this article will treat on the center-shoot system only. I will say, however, as regards the open-headed or vase system, which is preferred by many growers, that it is all right provided it is properly pruned from the start. There is one disadvantage, however, in the open-head system in that the trees will frequently split down with the first lot of fruit, which is a great loss to the grower, it having taken six or seven years to get the tree into that period.

I will now attempt to explain the benefit of center or leader system. In starting the tree with the leader system you would start with three branches and leader, and each year lead out another branch or two from the leader until you would have the required num-

ber, as about six to eight branches from the leader. Now, the advantage in this is that in place of carrying the load on three or four main branches, all starting at the same point, you have the branches distributed along the main trunk at a distance of five or six feet,

### Features of this Issue

PRUNING, OR THE TRAINING OF  
FRUIT TREES

BUILDING OF AN APPLE ORCHARD

SCIENCE OF PRUNING AND SHAPING  
OF FRUIT TREES

THE APPALACHIAN MOUNTAIN  
ORCHARDS

THE ART OF SUMMER PRUNING

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ING STUMPS

CO-OPERATION IN THE MARKETING  
AND HANDLING OF FRUIT

and in place of carrying the load on three or four branches you have it distributed on six or eight branches, and for this reason I believe that the center-shoot system has a great advantage as regards strength to hold a load of fruit with less support than the open-headed system.

The term "avoid forks" is often used in pruning, though the writers fail to explain how to proceed in order to avoid those forks. When you start a tree it should be headed after planting at the desired height, which in most climates and most conditions would not be over twenty-four inches from the ground. Now, this tree, after starting its growth, will sometimes throw out sufficient branches to form a good head the first season, while again at other times it will only throw out two, three or four branches, which all make sharp crotches or forks, and all buds below that would only make leaf buds the first year. Many growers make a mistake right here. In starting new trees they will proceed at once to rub all these buds off, and the result is they have a very poor headed tree with a lot of sharp forks. In order to overcome this you should let all the buds grow the first year after planting, and if nothing but crotches is on your tree cut all of those crotches out the following spring

when the tree is pruned and leave your center leader. By so doing the dormant buds below will be forced out the second year and make strong branches, which will grow out in more of a horizontal shape from the main stalk. These make very strong main branches, as you may bend them clear to the ground without breaking them off from the trunk. However, it is necessary to see that the stalk you plant has a sufficient number of buds at least one foot below where you head your tree.

Figure 1 illustrates a one-year-old tree after planting, and you will notice it has a number of sharp forks close to the leader. In Figure 2 you will notice these have all been removed but three of the lower branches, which are intended to form the three main lower branches of the tree. The leader is cut back to about eighteen inches, and this in turn will rebranch, and from this you lead out another branch or two in such a manner as to come out between those that you first started below. You should then proceed in the same manner and cut out the sharp forks and leave those that would make strong main branches, and lateral branches will also be cut back. Figure 3 represents a two-year-old tree before pruning. This, however, had the limbs thinned out during the summer, so that



Figure 1—One-year-old tree after planting  
Notice long limbs in center all  
growing close together



Figure 2—Showing the same tree as in Figure 1  
after it has been pruned. You will see all the  
forks cut out and three limbs and a leader left.  
Notice all three limbs come out at right angles  
from the trunk.





Figure 3—Representing a two-year-old tree before pruning.

about all the pruning necessary is to cut or head the limbs back to the required distance. There is another thing I wish to mention in connection with cutting back; where a strong wind from one direction prevails during the growing season it is always necessary to cut to buds toward the wind in such manner as to force the tree against the wind and keep it from blowing over. This, however, is not necessary where there is no prevailing wind direction, and where this is the case the tree should be cut according to its habit of growth. If it is a close growing variety it is necessary to cut to outside buds, while a spreading variety should be cut to upper and inside buds in order to hold it up and off the ground. You will notice in Figure 3 that the



Figure 4—Representing the same tree as shown in Figure 3, after having been pruned. You will notice that it has five limbs and a leader.

tree has five branches and that the center and the leader are considerably higher than the rest of the branches. Figure 4 represents the same tree as Figure 3 after having been winter pruned. The cutting back should be done with a view of having a leader, so to speak, on each one of the main branches, and in this regard is treated quite similar to the center shoot or leader. The cutting back should be done according to the local conditions. In a windy climate it is necessary to cut a tree much heavier to make it stocky, so it will stand up against the wind, while where less windy you can leave more wood and get a large tree much quicker. Figure 5 represents a three-year-old tree before being pruned. You will notice from this illustration that this tree was pruned during the summer, the unnecessary limbs were removed and some of the limbs headed back. This was done to make the wood strong and stocky, which is frequently necessary in order to obtain the desired results, especially where a strong wind prevails during the growing season. You will notice the strong, stocky appearance in Figure 6, which represents the three-year-old tree after having been properly headed back. This tree now has eight branches leading out from the center leader, which is ample to make a good, strong tree. This was cut back in winter pruning to about eighteen inches of the last year's wood. Figure 7 represents a four-year-old tree before being winter pruned. This tree had the unnecessary limbs thinned out during the summer, but no cutting back was done on the branches left, which made a growth of about four feet. You will notice in this illustration that there are numerous fruit spurs all along the main branches and that the leader is about eight feet high. Toward the top lateral branches have been brought out. Figure 8 represents the four-year-old tree after having been cut back in the winter. This was not cut back as severely as the younger trees, as the shape of the tree at this age is practically made. It is always advisable to leave as much wood as possible, as the more wood you leave the more fruit bearing surface you will have. The ability of a tree to bear fruit depends largely upon the amount of fruit bearing wood you have, consequently as a tree gets older the cutting should always be lighter from year to year. By doing this your tree will start in bearing fruit sooner than it would if you continued to cut it back heavily. Some growers stop cutting back when a tree is four years old, and this is very well, provided your tree doesn't grow too tall and slim, which should always be avoided, particularly in slim growing varieties. Figure 9 represents a five-year-old tree before pruning. This is a well balanced tree in every respect and has strong side limbs, and the center leader is practically gone. This tree was also summer pruned and all unnecessary



Figure 6—Representing a three-year-old tree after having been pruned. Notice the stocky appearance of all the limbs.

limbs cut out during the summer, while no cutting back was done until the following winter. The winter pruning in this tree, as shown in Figure 10, merely consists of cutting back to buds all the limbs left. When a tree gets to this age the cutting back should be stopped and only such of the limbs as grow stronger than the rest should be cut back; also such trees as might have too thin a top should be cut back sufficient to make them stocky and to rebranch sufficiently to make the necessary amount of bearing wood.

The pruning of a young tree should be done in such a way that when a tree gets to bearing age there are no

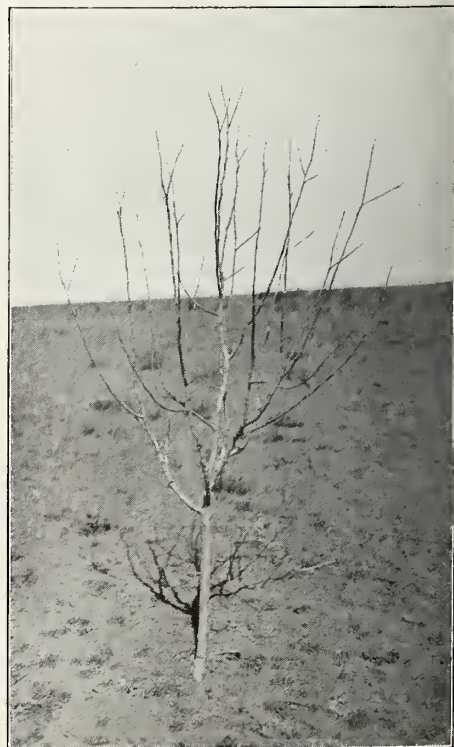


Figure 5—Representing a three-year-old tree before being pruned.





Figure 7—A four-year-old tree before being winter pruned. This tree had all the unnecessary limbs cut off in the summer.

large limbs that will need to be removed. The cutting of large limbs is always an unfortunate condition and should be avoided if possible by the proper pruning during the early life of a tree. Frequently an inexperienced pruner will leave too many limbs to start with, and about the time the tree is ready to come into bearing they will find it has too many limbs. As a result the fruit will be limb rubbed. Then, in order to overcome this difficulty, he will have to cut out large branches, and the cutting out of those large branches will throw the tree into wood growing when it should be bearing fruit. This is a very expensive and unfortunate condition which you will find in many orchards. I would also caution you about the over-bearing of young trees. Some varieties will start in bearing much younger than other varieties. Those varieties subject to over bearing



Figure 8—Representing a four-year-old tree after having been cut back in the winter

should be pruned heavier than the shy bearers in order to force the wood growth on the over bearers, while the shy bearers should be pruned lightly, and even summer pruned in order to force them into bearing. However, it is always advisable to leave all the wood on the tree that it will stand in order to produce first class fruit. Diseases of various kind sometimes affect a tree, or a heavy load of fruit, or storms of winter in the shape of sleet or snow, may affect some of the limbs, and if you thin your tree too much to start with you haven't got enough to spare a single branch in case of accident of any kind to your tree. By cutting off the injured or diseased limbs it would leave you without sufficient bearing surface on your tree to be able to get a good lot of fruit. Some growers frequently pride themselves on cutting their trees very heavily, and again others seem to be equally proud of letting their trees grow without any pruning. It should be your aim at all times to strike the happy medium. Prune your trees so that you have room to raise a good quality of fruit and at the same time have ample wood to bear a heavy load with as few props and other artificial supports as possible.

In cutting large limbs on old trees they should always be cut as close as possible to the main limb, and as soon as dry painted with white lead paint or else waxed. In waxing it would be necessary to repeat the operation probably every spring in order to keep it from cracking or peeling off, and the paint has the same drawback. A good many growers frequently make the mistake when their trees get old of not cutting back the long, slender limbs both in the top of the tree and the lower branches. From personal observation I have seen trees that grew from terminal buds for a period of five or six years. The result was that the trees had a number of long, slim branches without any side branches, and their bearing surface was too great. As a result the fruit was very small. Where this condition exists there is only one remedy, and that is to cut all the long limbs back. This pruning should be done in the winter, preferably on trees that over bear, while on shy bearers I would do all the pruning during the growing season. There is a difference of opinion as to when summer pruning should be done; local conditions should govern the time for this work more than anything else. In cutting back these large limbs on old trees, whenever it is possible to do so, they should be cut back to small side limbs. By doing this you will avoid a tree throwing out a number of sharp forks where the cuts are made. It is always preferable, however, to prune bearing trees lightly each year, and by so doing keep them continually in good shape, as the extra heavy pruning is liable to force a bearing tree into strong wood growth at the expense of fruit for a period of years. Outside of the cutting back very little



Figure 9—Five-year-old tree before pruning

pruning should be necessary in bearing trees, except cutting off the broken limbs or cross limbs. Of course, all watersprouts should be cut off during the summer, as the watersprouts hardly ever make fruit bearing wood. It sometimes is an advantage to cut back some of the small, slim branches inside of a bearing tree in order to keep them from crossing through the tree. By so doing you can save them and get fruit for a number of years, while if they were cut clean out it would merely lessen the productiveness of your trees just to the amount of the cutting you do.

What I have already said in regard to pruning of the apple will hold true to some extent about pears as well, though most pears, such as the Bartlett and similar varieties which have a tendency to fruit on terminal buds from last year's growth, should be cut back each season while young in order



Figure 10—Representing a five-year-old tree after having been winter pruned. Notice all the little spurs on this tree.



to prevent these terminal buds on the main branches from fruiting, and also to keep the tree stocky, which is fully as essential with the pear tree as it is with the apple tree, as many pear trees grow soft wood which is not able to hold a heavy load of fruit without breaking the tree all out of shape. In pruning all the varieties of pears that have a very upright habit of growth, like the Bartlett, I have seldom used the center shoot, as it would have a tendency to make the tree altogether too compact. As regards pruning of cherry trees, there is no need of such a heavy cut back as in the apple. After the tree is once headed and has a good shape all the pruning necessary consists of merely cutting out limbs that would make cross limbs and thinning out the extra branches where they are too thick. After the tree gets to bearing age this pruning can be done to the best advantage just after the fruit is harvested.

There are numerous pruning tools on the market, a good many of which are of no particular use. The only tools I use from the time the trees are planted up to six or seven years old are a pair of small hand pruners, and after that I use the small hand pruners, three long-handled pruners, an eight-foot, a ten-foot and twelve-foot, and

also a fine tooth pruning saw. This is all the tools necessary to do good work. I prune everything I can reach with hand pruners, and on young trees frequently prune from a step ladder, especially on trees where it is desirable to cut to buds, which should always be done as long as it is possible to do so, as the close cuts will heal over quite readily and form no wounds that might start decay in the tree as it grows older. Whenever a grower hasn't had experience himself it would always be better to employ an experienced pruner to assist in the work, but good pruners are always scarce, and it is not advisable to take a man's word for it, as frequently the parties going around through the country and terming themselves expert pruners know but very little about it, and if turned loose in your orchard may do a great deal more harm than good. While on the other hand, a good, competent pruner to instruct you in your own orchard for a few days would be the cheapest help you could employ, as he would give you more ideas about pruning in one day than you could pick up in a month by yourself.

Where there is a strong prevailing wind it sometimes is necessary to stake trees. Many growers make a very serious mistake when they do stake

their trees by staking them too young. They will stake a young tree and tie it back; the result is that the limbs will blow over; then in order to overcome this it would be necessary to stake again with a taller stake and tie the branches to this stake. This is quite expensive and tedious work, and not at all satisfactory. In order to overcome this prune the tree carefully and leave it stand and sway with the wind until it is three or four years old. The top will then be practically straight with the trunk, so drive the stake firmly in the ground, pull the tree back and tie it up straight. As the top of the tree will be straight with the trunk and your tree well balanced, it is only necessary to tie it in one place, that is right about where you head the tree. By that time the lateral branches are so stiff and solid, if the tree has been growing well, that it will never blow over again, and if you keep it tied in this manner for three or four years the trunk will be sufficiently strong and stiff to be self-supporting. It sometimes is necessary to take precaution against the string cutting into the bark of the tree. The best preventive against this is a short piece of rubber hose slipped on the string at the time of tying the trees back.

## Pruning, or the Building of an Apple Orchard

By A. I. Mason, Hood River, Oregon (Reprinted by request)

THE successful architect, before he plans to build a house, always selects some certain style of structure and then tries to follow it to completion. It is just so with the successful orchardist; he should first determine the style of structure of a tree that he desires and then follow it to completion. In other words, do not start an orchard by pruning a certain way one year and thereafter change it annually. If you do so, you will never obtain the desired results. If you want a tree with an open-center head or one with a center-stalk head you should begin your pruning with that fixed idea and follow it until completed. To obtain these two styles of trees requires an entirely different construction. I shall not attempt to describe in this article the construction of a center-stalk tree, for almost every horticultural paper or magazine has scores of writers who have been supplying us for years with their superior center-stalk arguments, and, I might add, that they never forgot to ridicule the open-center headed tree. Now, I will not be so severe on those writers, for I know they are honest and believe they are advocating the best method, yet I believe they are wrong, and I shall endeavor to prove it. I cannot forget some of the arguments I have had in years past with many prominent apple growers to whom I tried to explain wherein the open-center headed tree was by far superior. But time has

made some changes, and, being a natural born Missourian, I have tried to show them wherein an open-center headed tree, as I am growing, has many advantages over the center-stalk tree.

The building of an apple tree should begin when the tree is first set in the orchard—in fact the roots should be pruned before setting. Figure 1 shows a tree as it should be set. The bruised ends of all roots should be cut off smoothly, and if gnarled or crossed roots are found they should be pruned back so as to leave all roots pointing in as near a natural outward position as possible. After the tree is set and the dirt firmly pressed around it, being careful not to make it higher than the surrounding surface of land, you should then make your first pruning. If you have just one straight stalk, which I much prefer, you should make

your first cut about eighteen or twenty inches from the ground, as shown at "A," Figure 1, leaving the terminal bud toward the prevailing winds. If when setting your one-year-old trees you find some small side limbs below the twenty-inch cut, which is quite common with strong, vigorous trees, you should cut them back from two inches to four inches of the body of tree, as shown at "A," Figure 2. Always try to leave the stronger and longer stubs toward the prevailing winds; in fact when setting the tree you should always set the heaviest side limbs toward the wind. This rule will hold good with either one or two-year-old trees. I much prefer to set a one-year-old tree, and under no circumstances would I set a tree older than two years; and I might add that in selecting your trees be sure that you do not get large, overgrown, with all lower buds rubbed or cut off in the nursery. Get trees which will have at least a dozen good buds lower than twenty inches from the ground.

In cuts, as shown in this article, you will observe that each cut shows not only a tree of different age, but they are different trees—in fact all were taken by the same photographer at the same time. Figure 2 shows a tree just after pruning in the early spring following first year's growth. This was a one-year-old tree when set, and one which possessed three small side limbs. You will observe that all of these side



Figure 1—First Year



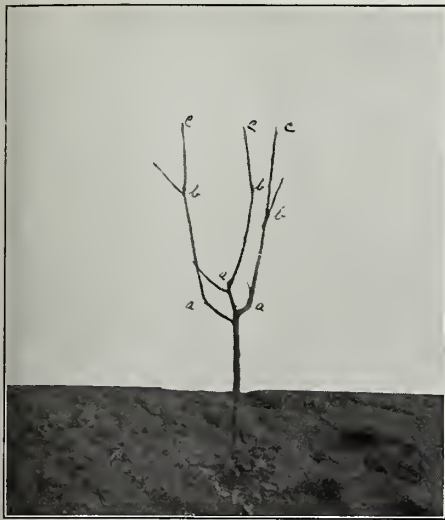


Figure 2—Second Year

limbs were cut back at setting time, as shown at "A," Figure 2. I also at this time cut out the center stalk just above the crotch formed by this whorl of three limbs. This we will designate as the first pruning. During the first few weeks' growth after a tree is set it will put out small sprouts at nearly every bud on the main stalk. All of these should be kept pinched back or rubbed off except the three or four stronger sprouts, which should be evenly distributed around the stalk. Then about the middle of July I make my second pruning and cut off the main uprights, as shown at "B," Figure 2. I also then remove all inside limb growth and leave only what few limbs have started to grow outward, and in such manner as to form a symmetrically shaped head. If side limbs are of uneven length I also clip back the longer ones, so as to form a well balanced head.

In building an open-center headed apple tree one should always bear in mind that the main upright stalks should be given the advantage in every respect. Always keep them in advance of the rest of the tree. All inside growth should be kept out, and the main uprights should never be headed back as severely as rest of tree. After



Figure 3—Third Year

a few years your whorl of center uprights will each become just as strong and vigorous growers as the original center stalk of a naturally shaped tree. Do I hear someone saying, "Let nature have its own way and grow a naturally shaped tree?" Yes, and I heard a prominent apple grower make this same statement in Columbia, Missouri, two years ago. It was at their state horticultural meeting, and this grower seemed to be proud that he had an eighty-acre orchard which had never been pruned. Said he: "Nature provides to shape a domestic tree as well as one of the forest." To those who believe this theory I would suggest that they go to the mountains and gather crabapples, and not molest nature by trying to produce our luscious Spitzenberg and Yellow Newtown apples.

After your July pruning the first year, you should do no more pruning until the wood of the tree is well matured for the winter. I much prefer to do the next pruning in the spring-time, but we are always governed by local conditions, hence, if in a climate where danger arises from heavy snow and sleet, I would make this next pruning about the first week of December; otherwise I would wait until spring. At this pruning I would cut main uprights, as shown at "C," Figure 2, and also remove all limbs that do not grow outward and assist in forming a well balanced head. I am a firm believer in heavy pruning for the first few years. I want a decently shaped tree as well as a tree strong and stocky enough to support its fruit.

Don't be over anxious about your trees not bearing early. When you have obtained a healthy and well balanced tree, with a strong and heavy framework, you need not worry about getting your fruit, for your troubles then will be how to make your trees carry their burden. In Figure 3 you will observe the pruning has been done and the tree is ready to take on the third year's growth. This is about the last year in which I would cut back strong and stocky varieties, except when necessary to obtain a shapely head to the tree. Our Newtown trees as a rule do not need the tops cut back after the third year, while our Spitzenberg trees should be topped at least two years later, and then about every other year for at least the remainder of the first twelve years' growth. Every successful orchardist must learn the nature of every variety of tree in his orchard, and prune accordingly, before he can become a proficient pruner. He must also take into consideration the climatic and soil conditions under which he is growing his orchard.

To those who may find objections to some of my ideas upon pruning, I desire to say that they are based upon our local conditions in Hood River Valley, and my experience is limited personally to two varieties, the Spitzenberg and Newtown. However, I have



Figure 4—Fourth Year

one tree each of six other varieties, and with a little diversion in pruning I am able to form very desirable open-center heads on all of them.

You will observe in all of my tree illustrations that the pruning has been done just prior to the beginning of a new year's growth. You will also notice that Figures 1, 2 and 3 all show a cutting back of the previous year's growth at terminal of limbs, and also a heavy thinning out of superfluous limbs. But beginning with Figure 4, and thereafter, you will observe that my topping consists of cutting back only to lateral limbs, always cutting so as to leave the remaining limbs toward the prevailing winds. And I want to say right here that I can hold a tree in better shape relative to the wind by pruning intelligently than by any other method known to horticulture. Props, poles, anchor wires or ropes sink into insignificance compared with the pruning shears when you desire to build a beautifully shaped



Figure 5—Fifth Year





Figure 6—Sixth Year

and stocky growing tree under unfavorable conditions. However, after you have built the above described tree then it becomes necessary to render nature some assistance in maintaining its abundant supply of fruit. How to do this I will describe later in this article.

Figures 4, 5 and 6 all show the development of the main structure of an apple tree. The pruning in all these is about the same. At each pruning I remove all superfluous limbs, as those growing inward or crosswise of tree, also those that are too close to other limbs, and which will later become a part of the framework of the tree. One of the most common errors made by the inexperienced orchardist in starting the head of an apple tree is to leave too many limbs for the lower framework of the tree. I prefer three limbs at base, and would prefer to have them distributed up and down the trunk as far apart as possible, but we cannot always obtain our preference, and have to be satisfied with what we can get. This is true in building an apple tree. Hence we may at times be forced to let four branches form the main frame-

work for the head, but in all cases hold your first uprights as far apart as possible, and keep the center open and free from all limb growth. Sometimes it becomes necessary to sacrifice a part of one of the already established uprights by cutting it back to a lateral limb, so as to more evenly balance the head of the tree, and also to make a wider opening in the center of the tree.

In all of these illustrations you will observe that there has been many prunings compared with the age of the tree. This is explained by my pruning twice a year—in the middle of July and in winter or spring. I am confident that two prunings each year is by far the best. With young trees it enables me to obtain a tree of a more perfect balanced head in a shorter period, and also stimulates the growth of fruit buds on trees that are inclined to delay in bearing. However, after a tree has become large and is bearing nicely the pruning in summer consists in removing watersprouts, while in the winter months or early spring the grower can then cut out all cross or inward growing limbs, broken or injured limbs as well as an occasional limb which has become a nuisance by crowding some other part of the tree.

I have now told you how to build the framework and shape the head of an open-center apple tree, but I have not told you how I make it stronger and more desirable as well as more convenient than the center-stalk tree.

To those who are opposed to the open-center tree on account of it being weak and easily split down, either with snow, sleet or fruit, I will frankly admit that if we do not give nature some mechanical assistance in this style of tree that it is a failure compared with a center-stalk tree. But under our climatic and soil conditions in this valley we are compelled to either use props or some other device to assist our apple trees in carrying their heavy loads of fruit, and it matters not what age, or whether we have open or center-headed trees. To do away with propping is one of the greatest advantages of an open-center headed tree. I have adopted a system of wiring which remains permanently in the tree without injuring it, and without a rival as far as natural or mechanical supports are concerned. Each main upright stalk is wired to a small ring in center of tree. See Figure 9. Each wire is fastened to a screw eye, which is serewed into the main upright. This gives an umbrella system of supports and every upright is held in its natural position to be used as a framework, to which we support all outside limbs which are heavily loaded and require a support. The higher this interior wire system is placed the better, for it gives a better opportunity to tie the outer and lower limbs. I used a twelve-gauge galvanized wire, a half-inch galvanized harness ring and a small eyed screw eye about one inch long. In about three years the wood growth has about covered the sereweye and only a small wire



Figure 7—Thirteenth Year

remains protruding from the main stalk. When these wires are put in carefully and in a neat manner it is there for a lifetime, and it matters not what kind of a crotch is at the base of tree, it is absolutely the strongest tree that can be constructed. Instead of a center-stalk tree with one main upright about six or eight inches in diameter, you have from four to eight uprights from three to four inches in diameter, and all of them arranged in a circular position forming a circle from three feet to four feet in diameter. This wire system should not be put in limbs smaller than one inch in diameter, and in order to get these wires as high as possible I have adopted a temporary support (see Figure 8) to be used for a few years until trees are taller and uprights larger.

If trees are early bearing varieties, or you are in a district where sleet and snow weight your trees during the winter, it is then advisable to add a temporary support to these trees which are too small to receive the permanent wire supports. Figure 8 shows a cross section of the main upright branches

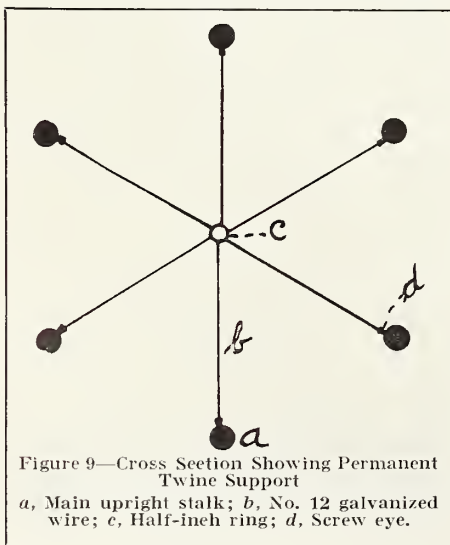


Figure 9—Cross Section Showing Permanent Twine Support

a, Main upright stalk; b, No. 12 galvanized wire; c, Half-inch ring; d, Screw eye.

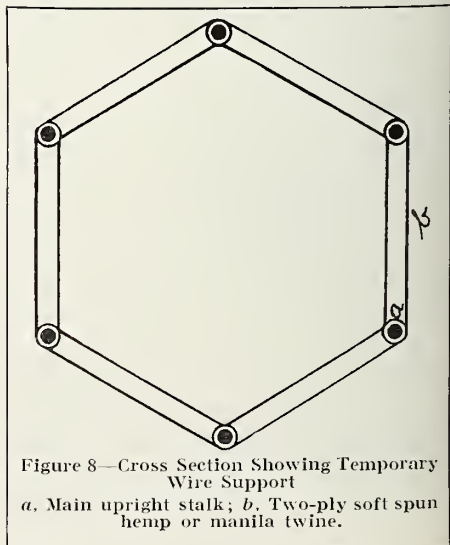


Figure 8—Cross Section Showing Temporary Wire Support

a, Main upright stalk; b, Two-ply soft spun hemp or manila twine.





Examining the Buds in F. R. Barney's Orchard, Grand Junction, Colorado, After the Freeze Ideal Coal Heaters used. Crop saved

of a tree from four to six years of age which needs an early support. I encircle the main uprights with a system of separate loops of twine. You will observe that each limb is connected with each other limb next to it by tying the twine in a circular belt around both limbs. This gives each upright an opportunity to expand in growth without obstruction of sap flow, and also insures the uprights to always retain their correct position, and it matters not to what kind of stormy weather the trees have been subjected. I use a soft spun two-ply twine, either Manila or hemp. Under our climatic conditions this will last at least three years, after which I put in the permanent wire support, as shown in Figure 7 and Figure 9. In Figure 7 one of my orchard men is standing on the wire system, which was placed there three years ago. The wires upon which he is standing are too small to be shown by a photograph. If you will look closely you may see some of the twine strings which connect the side limbs to main uprights. These side limbs were heavily loaded with fruit last season. I use the same twine for tying the side limbs that I use for temporary supports, and I never remove a twine until it has become rotten or has broken.

The cost of placing the permanent wire system in each tree is about twenty cents, including labor and material. Compared with propping trees the tying with twine and supporting with wire is by far the cheaper method, less liable to injure the limbs and more safe in protecting apples from falling or limbs from breaking.

I believe I have given you some ideas that will assist you in obtaining an open-center tree, and I believe I should now give a few reasons to substantiate my ideal method of building an apple tree. An open-center tree, braced as I have outlined, is much stronger than the center-stalk tree. It provides better opportunity for sunlight and circulation of air, thereby producing higher color and better keeping qualities of

the fruit on the interior of tree. It provides an open center which is a work-house for my apple thinners and pickers. It makes it possible for me to get to the center of my tree on a bridge supported by two tripod step ladders on either side of the tree (which time and space forbids me describing here), and from this bridge my apple thinners and pickers can work without climbing into upon the limbs. It enables me to spray my fruit more thoroughly and holds the head of the tree in the best possible shape for self-protection against storms, heavy winds and heavy loads of fruit.

I could give many reasons why I prefer a low-topped tree, but I cannot impose upon your good nature at this time. However, I must say something relative to the pruning tools. All tools that I want are a pair of small hand pruners, two long extension pruners (one eight feet and the other twelve feet) and a small pruning saw. I was somewhat amused when I noticed a picture in a back number of "Better Fruit" wherein it showed eight or ten pruners upon high step ladders trying to prune with short wooden handled

pruners about two feet long. This represents, in my opinion, a waste of labor as well as very poor results. You are too close to limbs to make comparisons. When you work from the ground you are farther from the top, can better compare one side of the tree with the other, and hence can make a more shapely tree, and you can cut off twice as many limbs in half the time. If it is a cold day you can move around enough to keep from freezing.

One more thought on pruning, then I have finished. If it should become necessary to remove a medium or large sized limb, cut it close to the remaining stalk and cover the wound with good grafting wax. Please don't use paint. It is absolutely worthless as compared with wax, and is no cheaper. No end grain wound on an apple tree was ever painted that did not in a short time show cracks, and at the bottom of which the wood soon begins to rot. In my orchard I can show you end grain wounds five years old on some worked over Ben Davis trees that have not yet healed over, and the wood is just as sound as it was the day it was first cut. I rewax the wounds each spring. These trees were eight years old when grafted, and many limbs from three inches to four inches in diameter were removed.

The wax I use is made as follows: One pound tallow, two pounds beeswax, four pounds resin, which melted together forms the stock solution, and, when using, thin with turpentine, according to weather conditions. If real cold it will require more turpentine, and if real warm it will need but little or no turpentine. Add turpentine by remelting a part of the stock solution.

#### Editor Better Fruit:

Yours of the sixth instant at hand, and in reply I wish to thank you very heartily for the favor of your most excellent publication. It does not require it, however, to keep us convinced of your good work, but we are mightily glad to get it, for it is good reading and instructive. Again thanking you for your courtesy, we are very respectfully, Walla Walla Commercial Club. L. M. Brown, Publicity Manager.



Loading the Ideal Orchard Coal Heater for the Second Time, After the Freeze of April 15, 1910 Orchard of F. R. Barney, Grand Junction, Colorado



# The Science of Pruning and the Shaping of Fruit Trees

By Professor Wendell Paddock, formerly of Colorado State Experiment Station

IT is not generally realized that when a tree is taken from the nursery row a large portion of the root system is left in the ground. The balance between the roots and the top is thus destroyed, and obviously a part of the top should be removed. Practically all of the elements which nourish and build up a tree, save one, are taken from the soil by the roots in liquid form. This material is carried in the cell sap mostly through the outer sap wood to the leaves. Here the crude food is changed by the influence of the sunlight and the green substance of the leaves to a form that can be readily assimilated by the plant. Much of this elaborated food may be stored in the cells, especially in the fall, to be drawn upon at any time that the roots fail to supply the requisite amount. In transplanting the nursery tree is often deprived of one-half or more of its roots, and not only must it become established in the soil, but it must produce a large number of new roots before much new food can be supplied. In the meantime the leaves begin to push out and the reserve food and moisture may all be used before the root system is in a condition to supply more. Is it any wonder, then, that the failure to cut back the tops of newly planted trees results in the death of many of them? This is especially true in Colorado, as the dry air and intense sunshine cause the young trees to dry out rapidly. The trees should be heeled in deeply, at once, in damp soil, and when planting the work should be so arranged that the roots shall be exposed to the air for the shortest possible time. All bruised and torn roots should be carefully removed, leaving smoothly cut ends which will readily heal; if this is not done decay is apt to

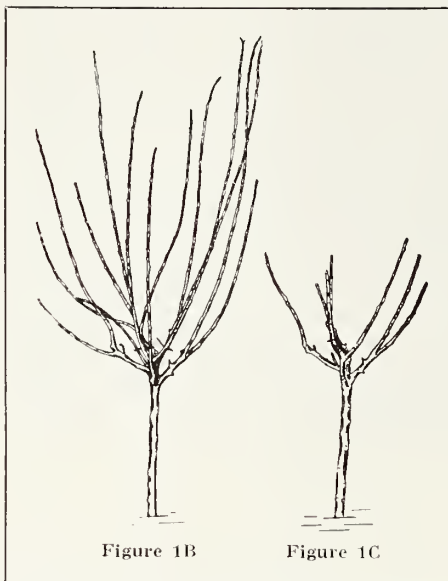


Figure 1B

Figure 1C

set in, which may seriously injure the tree. Long, straggling roots may well be shortened, and if a tangled mass of fine roots are present they should be shortened and thinned. Some successful growers also insist that where large spreading roots occur a slanting cut should be made, so that the cut surface may rest flat upon the ground.

There are several insect pests and plant diseases which are very common on young trees. The woolly aphis is such an insect, and it is doing a great amount of damage in all sections of the state. This insect lives on the roots of trees, and is introduced to our orchards almost wholly by infected nursery stock. When once established it spreads rapidly and is almost impossible to eradicate. Crown gall is a common disease in many nurseries, and it attacks all kinds of fruit trees. It is the worst kind of folly to plant a tree which has a trace of this disease, for not only is the tree pretty sure to die before it comes into full bearing, but the infection may be spread by the cultivator or in irrigation water to all parts of the orchard.

The proper formation of the top is by no means the least important reason for cutting back the branches of newly planted trees. In the first place, the importance of low-headed trees for this climate cannot be too strongly emphasized. In addition to forming low heads there can be no question but that it pays to still further protect the trunks of newly planted trees from injury by sun scald. Various devices are used, such as wrapping the trunks with burlap, paper, straw, wood veneer, or by shading the trunk on the southwest side with a thin piece of board set upright in the ground. Whitewashing the young trunks to serve the same purpose has come to be extensively used in portions of California.

The advantages of low-headed trees may be mentioned as follows: Greater

ease in picking, thinning, pruning and spraying, and less damage to trees and fruit from winds. Some growers object to low-headed trees on account of the greater difficulty of cultivating around them, but with proper pruning low-headed trees develop the ascending branches. These trees (referring to illustration) can be worked around as easily as they could if they had only one trunk.

In pruning trees one of two ideals must be adopted, which are known as the pyramidal and vase forms. The former preserves the leader, which is made to form a central shaft to the tree. This style has the advantage of more bearing surface, as the leader grows, and in time forms a "two-storied" tree. The leader is done away with in the vase form and a few limbs, usually not more than five, are selected to form the top. A more or less open-centered tree is thus formed, but by skillful pruning this space is occupied by branches of bearing wood.

The term low-headed is a relative one, but a top may be considered low when the first branch is thirty inches from the surface of the ground. Our own preference is for a trunk about twenty inches in height. But whatever height is determined upon the tree must be cut back, preferably just after it has been planted. Should the tree be supplied with suitable limbs at the point where the head is desired three to five of them should be selected to form the framework of the tree. The rest should be removed. The selected branches should then be shortened into a sound bud within a few inches of the main stem. But ordinarily the lower branches are pruned off in the nursery, so that we sel-

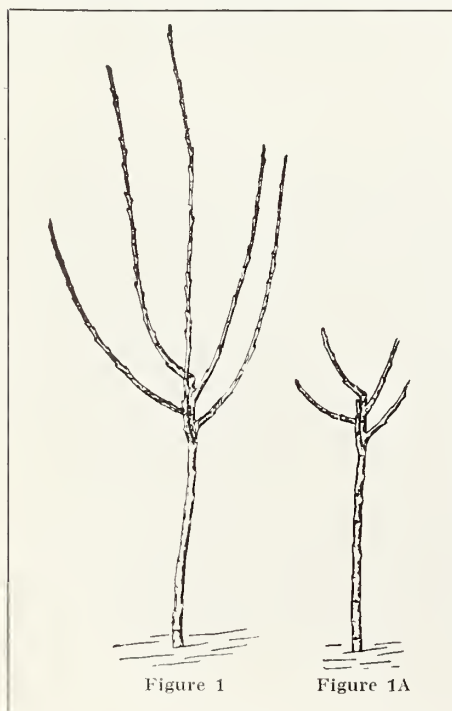


Figure 1

Figure 1A

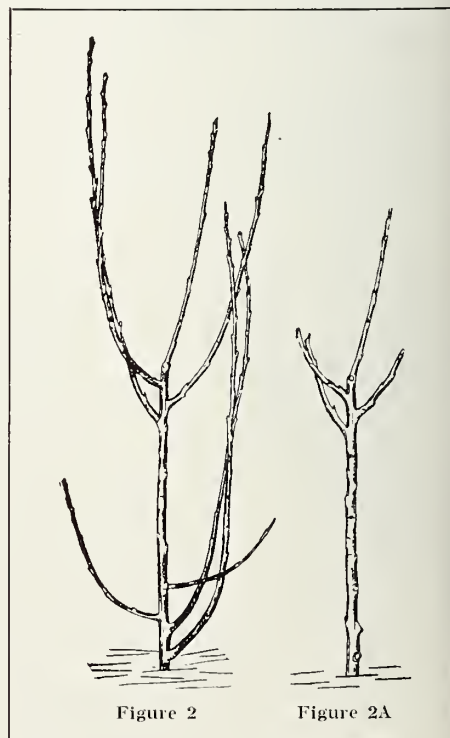
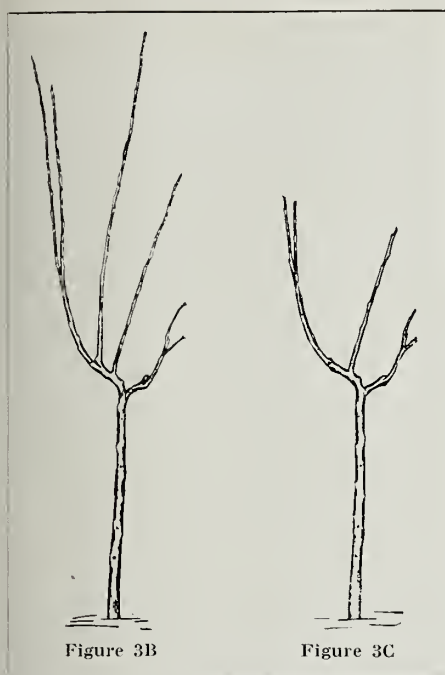


Figure 2

Figure 2A





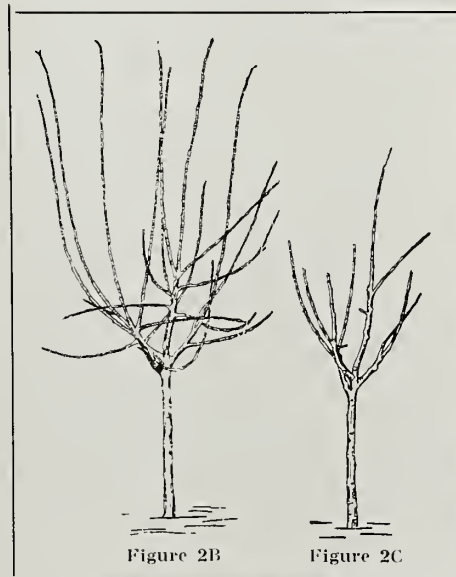
dom get a tree from which suitable branches may be selected. In this case the entire top should be removed without regard to branches, making the cut a foot to eighteen inches above the point where the lowest limb is wanted. In doing this it is expected that branches will push out below in sufficient numbers, so that suitable selections may be made. For this reason strong yearling trees are always preferable to older ones, and in fact apple trees of this age are now commonly used in California. Should suitable branches fail to grow one of the lower branches, which nearly always form, must be developed to form a new head. The trees should be gone over several times during the first summer to remove surplus shoots, and especially those which push out far below the point where the lowest branch is wanted. Occasionally some of the upper branches develop a vigorous growth at the expense of the others. These should be headed back so as to give all a chance to develop, otherwise some of the important scaffold limbs may be found to be very weak at the close of the season. When a branch is headed back great pains should be taken to make a slanting cut just above a sound bud. If made too far above the stub will die back at least as far as the bud, and often farther. If made too close the bud may be so injured that a stub is formed which will die back at least to the next sound bud. Ordinarily a profusion of branches will be pushed out, which may be allowed to grow as they will during the first season, or they may be cut back to one or two buds. By the time these branches begin to grow the roots are established in the soil and new ones formed, so that an adequate supply of plant food is provided.

The kind of top which the tree is to assume is developed with the first season's pruning, which should be begun in most sections not earlier than the

first of March. It is commonly understood among orchard men that trees must not be pruned when the wood is frozen. In any case the rule is a good one to follow. From three to five limbs are now selected to form the framework of the tree, which should be cut back about twelve inches from the trunk. The rest are removed. If the lowest branch has been taken out at twenty inches from the ground the highest branch should be at least a foot above. A common mistake is to cut trees back too far, thus crowding the branches. Neither were these branches thinned out nor headed in during the first season, but were all allowed to develop into leaders. This latter mistake often results in long willowy branches, which droop with a load of fruit, and is the main reason for condemning low-headed trees. Many growers carry their pruning up to this point successfully, but fail to head in the first season's growth, and so miss one of the critical points in the proper formation of the top.

Second Year.—It may be regarded as a rule that when a limb is cut back, unless the cut is made just above a strong lateral, two or more branches will develop near the cut end and some of the buds lower down will develop into shoots. The usual practice is to allow two of these to grow on each of the previous year's limbs to form an additional framework for the tree. The two selected should be some distance apart, one at the end and one farther back, and so placed that the development of crotches will be impossible. They are now cut back from a half to two-thirds of their growth and the laterals are shortened to one or two buds, so that they may later develop fruit spurs and also shade the branches with their cluster of leaves. If too many have formed some of them should, of course, be removed.

Third Year.—The framework of the tree should now be well formed, so that it will require less attention from this time on. Surplus branches and those that rub or are inclined to form crotches should be removed. Very vig-



orous growths should also be headed in. Thus far our discussion has been confined to the shaping of open or vase-formed trees. If a leader is desired the treatment is practically the same, except that the upper shoot is allowed to grow with little heading in. Branches are allowed to develop on this leader at proper intervals, using the same care as to location, pruning and development as in the former case.

The trees in Figures 1 and 2 were all headed back about twenty-four inches in April. This left them mere stubs. Had there been any laterals below this point they would have been pruned back to single buds, so that clusters of leaves might have formed, and thus provided some shade for the trunks. These pictures show how the trees looked the following April, at the time of the first pruning. No. 1 had formed five vigorous branches and No. 2 produced four. The five branches on No. 1 were saved to form a framework for the tree, and were cut back to about one foot in length. These are well distributed about the trunk, but have the fault that they are too close together. The lowest limb might well be double the distance from the top that it now is. No. 1a shows No. 1 after it was pruned, with the idea of making an open-center tree. No. 2 is also open to the objection that the limbs are too close. All of these were saved to form the framework of a tree with a leader, as is shown in No. 2a. The only difference between this and No. 1a being that the topmost branch was left longer than the others. The pruner of this tree is open to severe criticism in that he has allowed three vigorous limbs to grow from near the surface of the ground. These limbs could serve no useful purpose, and so only rob the other limbs of plant food. Such growths are best prevented by pinching off the buds



early in the season. No. 3 has failed to throw out enough branches to form a suitable top. The two which it produced are nearly opposite, so that a bad crotch would soon result. Both these branches were cut back to the second bud, as shown in 3a, in the hope of inducing dormant buds to push out lower down. No. 4 shows one of this lot of trees that was left unpruned. Notice the weak spindling growth and short laterals, as compared with the others. There is small chance of making a decent tree out of such a specimen, even though it should live. Such illustrations as this should prove to anyone that all trees should be headed back when planted, if for no other purpose than to induce a vigorous growth.

Pruning should, of course, be done in late winter or early spring, but these trees were pruned for the purpose of illustration, and the results are shown in 1c, 2c and 3c. Tree No. 1 has now taken the form shown in 1c. One of the scaffold limbs seemed superfluous, so it was removed and the new growth, shown in Figure 1b, was cut back about one-half. The few side shoots were cut back to a single bud, with the idea of developing fruit spurs. During the season of 1906 numerous branches should develop on all of these scaffold limbs. As a rule two of the best placed of these secondary limbs will be selected on each of the main scaffold limbs to form additional framework. The rest may be removed or cut back to develop fruit spurs, as may be. The form of the tree, then, should be developed at the beginning of the season, and subsequent pruning should be directed toward retaining this shape, cutting back excessive growths, and thinning and renewing the bearing wood. The pruning of tree No. 2 is much the same, except that a leader is being developed. Figure 2c shows that although the top was cut back the same as tree No. 1, the topmost branch is developing into a vigorous central shaft. The first set of scaffold limbs have been formed and a second set is to be developed at a suitable distance above. The new growth is to be cut back the same as has been described. The tree shown in the series 3-3c is, so far, pretty much of a failure. The severe heading given it in the spring failed to make branches develop lower down. It would have been a better plan to have inserted two or three buds at suitable points around the main stem in June. This can probably be done next June, but the chance for success is not so great. Limbs can be developed by this means just where they are wanted, but the average person will succeed better with trees which do not require such manipulation.

The form of the young tree should be well established after the third season. From this time on the question of pruning is simply to retain, so far as possible, the form we have started to prevent the formation of crotches and cross branches, to thin out an excess

of branches, so that sunlight may be admitted and the amount of bearing wood reduced and renewed. Prune in summer to induce fruitfulness and in winter to promote wood growth. This is true for the reason that summer pruning checks the growth of the tree by removing a portion of the leaf surface. An injury of any kind will have the same effect, likewise a weak growing or sickly tree should be severely headed in while still dormant in order to induce a vigorous top growth. Thin out the top then every year. No general rule can be given, as each tree presents a different problem. A thick growth of branches results in weak bearing shoots and spurs. And finally, when cutting back limbs on bearing trees, the cut should be made just above a strong lateral wherever possible. The tendency of the sap will be to flow into

the lateral, and thus prevent the formation of numerous branches which nearly always results when a stub cut is made.

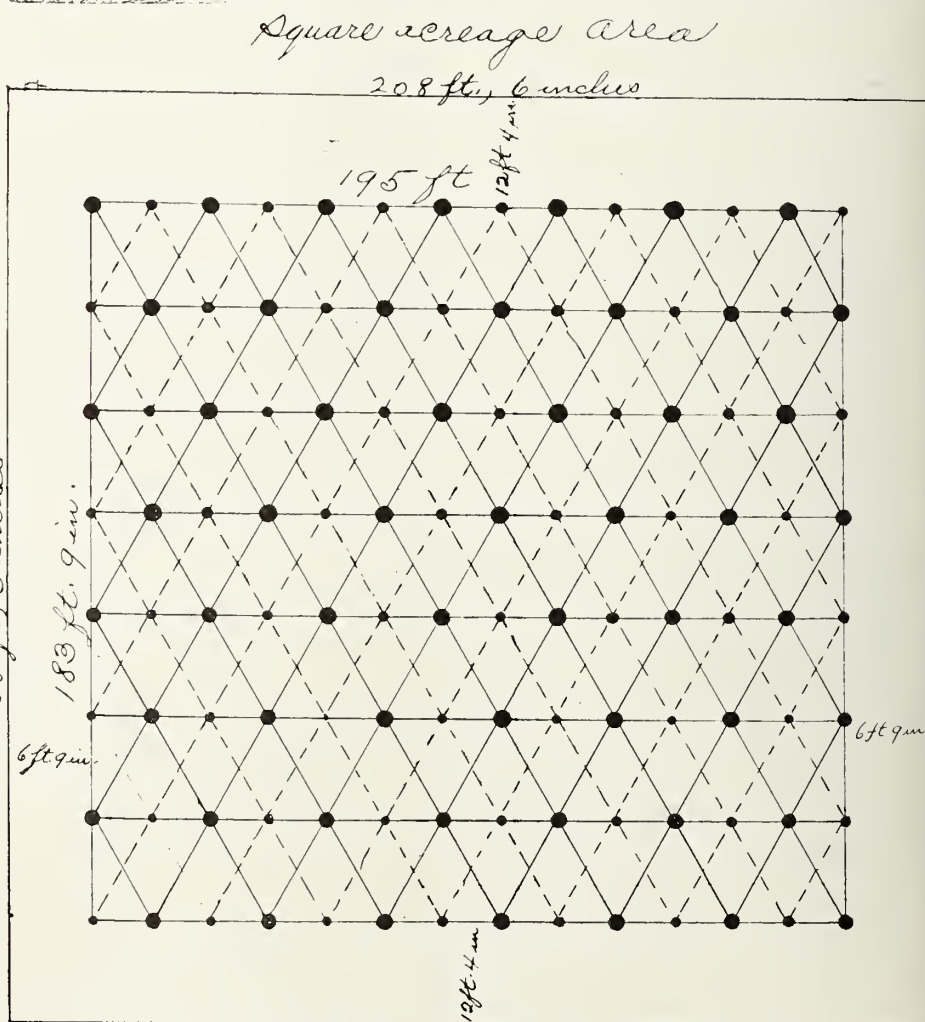
One should become well acquainted with the habit of growth of different varieties, as a few kinds grow slowly and will not bear heavy pruning. Others are erect growers and some are spreading. The upright varieties may be spread somewhat by pruning to the outside laterals, and the spreading kinds may be contracted by cutting to those which have an inward direction. And by cutting back the vigorous growths each season, those two feet and over in length, the limbs are made stocky, thus in a great measure doing away with drooping branches. This can only be done by intelligent annual pruning.

## Hints on Hexagon System of Tree Planting

By F. J. Rupert, Salem, Oregon (Reprinted by request)

AFTER looking over the various hints on tree planting by the square and hexagonal, triangular systems it occurred to the writer that the latter system might be placed before the planter in a way which would give him a clear and concise idea of just how to lay off his land, either in setting out one or more acres of apples, pears, etc., and provide him with infor-

mation as to the exact number of permanent trees and fillers required. The article by W. H. Lawrence in December, 1909, number of "Better Fruit," together with the illustrations, was truly of value to the planter who desires to adopt the square method of planting permanent and filler trees, as it shows exactly the number of trees per acre and distance apart of permanent trees,





as well as distance of fillers from the permanent trees, viz.: Permanent trees thirty feet apart each way, seven rows of trees, seven trees to the row—total forty-nine permanent trees per acre. Fillers in center of each square of four permanent trees, 19½ feet from permanent trees, allowing 36 fillers, or a total of 85 trees per acre. Also, on page 28 of the same issue, Mr. Edward G. Merwin describes to a certain extent the method of planting by the hexagonal system, showing small diagrams to illustrate the same, also giving information relative to thinning, but there is an absence of illustration to show acreage planting, number of trees, both permanent and fillers, which will be shown by the accompanying diagram.

Here is shown a plat representing an area of 195x183 feet 9 inches, or approximately 42,997 square feet. It will be observed that the width of the area is the greater. We will presume that one acre is to be set in apples. Commence at a point 12 feet 4 inches below and 6 feet 9 inches to the right of upper left-hand corner and set stake for first permanent tree, 30 feet to the right of this stake set stake for second permanent tree, and so on until seven stakes have been set 30 feet apart crosswise of the area in a straight line, as shown by the large

dots, which represent the permanent trees. Then measure down from a point midway between two first permanent trees 26 feet 3 inches and set first stake for permanent tree of second row. Measuring from this point to the first or second permanent tree diagonally the distance will be thirty feet. Then to the right thirty feet set stake for second permanent tree of second row, and so on across the area. Proceed according to the diagram until you have set stakes for eight rows of seven trees each. Here, instead of having 49 trees thirty feet apart as in the square method of planting, you have 56 trees, each thirty feet apart, a gain of seven trees within the acre area. It is largely the rule with planters in setting out a young orchard, by way of economy in the land, to plant what are known as fillers, or some other variety of fruit, such as peaches, between the permanent trees. Dwarf pears may also be used, they occupying less space than the large or standard varieties. We will presume that peaches are used as fillers. They come into bearing earlier than apples or pears, and also some other fruits, and several crops may be harvested while the permanent trees are coming into full commercial bearing. So long as the fillers do not crowd the perma-

nent trees or render cultivation, pruning, etc., difficult they may remain in the orchard and produce an income from the spare ground space. When they do begin to crowd the permanent trees by way of obstructing the free inlet of sunlight, or interfere in any way with the proper care of the permanent trees they may be removed, but they will have paid for themselves many times over before it becomes necessary to remove them.

By further reference to the diagram it will be seen that there are smaller dots between the larger ones. Each small dot represents a filler tree. The fillers thus set will be fifteen feet distant from the nearest permanent tree. In this case the same number of fillers may be used as permanent trees, or 56. The total number of trees to the acre will thus be 112 instead of only 95 by the common square method of planting.

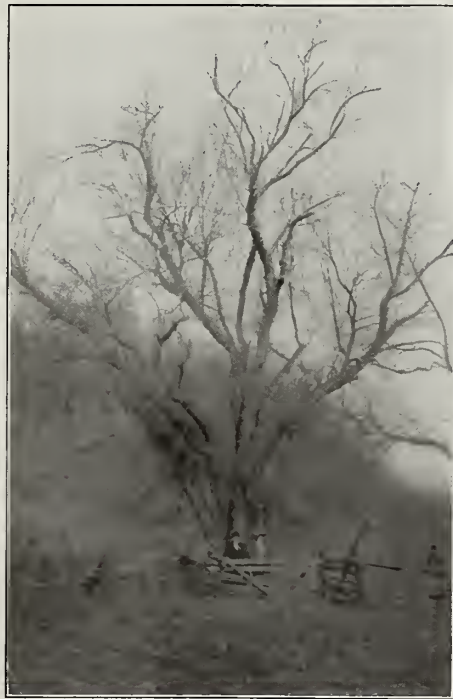
As aforesaid, it is presumed that one acre is being thus planted. As there are approximately 208½ feet on the sides and ends of an acre square of land, in setting the trees within an area of 195x183 feet 9 inches, as shown by the diagram, there will be a margin on both sides of 6 feet 9 inches, and on both ends of approximately 12 feet 4 inches.

## The Appalachian Mountain Orchards

By Professor H. E. Van Deman, Washington, D. C.

FOR the early pioneers who first settled at Jamestown, Plymouth Rock, and in turn all the eastern parts of North America, it was very natural to bring with them the fruits they and their fathers before them had grown in their old homes across the sea. Thus came the grape, the peach, cherry, plum, pear and the apple. Indeed there are few of our standard fruits from the orange and lemon of the same tropics to the currant that flourishes only in the cooler regions that we did not get from the Old World. We have taken under culture, it is true, some of the native fruits of America and made much of them, but for the most part we are indebted to the ancestral homes of our forefathers for those that fill our markets and delight our palates. Some of them, or perhaps all, we have improved by producing new varieties, and of the apple this is notably true, for nowhere in all the world has there originated and been grown so many choice apples as in America. The use to which the grape and apple were chiefly put in Europe and in all the Old World in the centuries gone by was for making wine and cider, and that was the main object in planting these fruits on this side of the ocean by those who came to make their new homes in the wilderness. They had been used to wine and cider, and likewise their fathers before them, and any variety that would make that which was the most alcoholic was the best. But the grape and apple, as

articles of food, have come into their proper estate in this country more than elsewhere in all the world. The pioneers learned to appreciate the value of good apples to eat, and they not only ate them in the fresh state, but dried them to serve as a part of the winter's store of food. And it must have been



The Handy Apple Tree  
Description of this tree will be found in article  
"Appalachian Mountain Orchards"

in the brain of some thrifty and provident Yankee woman of the olden times that apple butter had its origin. As the settlements spread the orchards spread with them. The coast regions were found to be less fertile and not so well adapted to farming as the valleys along the streams that flowed into the Atlantic, and they were followed up to their sources in the mountains. There the bold pioneers, with gun in one hand and axe in the other, wrested from the savage and the wilderness the bonus of our ancestry. In those days of primitive horticulture there was scarcely a grafted or budded fruit tree planted. The art of propagating and the nursery industry were almost unknown. "Johnny Applesseed" was not only a blessing to the age, but the hero of pioneer American pomology, and it is fitting that to the memory of John Chapman there is standing at Mansfield, Ohio, a monument to attest to the generations to come his many good deeds.

When on a recent tour of observation in the mountain sections of North Carolina and Virginia I saw one of the most notable and, I think, the largest apple tree in the world. It came from seed that was supposed to have been thoughtlessly dropped in an apple core about a century ago at a hunter's camp in what is now Patrick County, Virginia. I have been to the spot and put my arms part way around the giant trunk, which is over four feet in diameter. This tree is over sixty feet high



and over seventy feet in spread. After a storm some years ago two wagon loads of wood were cut and hauled from its broken branches. Over 130 bushels of apples have been gathered from a single crop. It stands in a rich little valley, far up toward the Blue Ridge, is yet in fair vigor and is known as the "Handy Apple Tree," from the name of the owner of the little mountain farm. This tree is only one of thousands of apple and cherry trees of lesser size that flourish in this orchard paradise. In the course of my travels through this part of the Appalachian Mountains I have had the opportunity to see many of the oldest and also the best of the modern orchards planted there. During the last trip, which was made when the spring flowers were in their best attire, but before the rhododendrons and azaleas had bedecked the mountain slopes and borders of the trout brooks with the full glory of their season, I saw more of these orchards than ever before. The planting has increased wonderfully of late, and is still in rapid progress. I saw one large orchard near Altapass, North Carolina, on the Chickfield Railway and on the crest of the Blue Ridge, that has recently been planted, where there are a few very old apple, pear and cherry trees that were set by the pioneers. A more suitable orchard site I have never seen, except in the lay of the ground, and the young trees give every promise of success. The soil is loose, deep and rich in plant food and humus. The climate is cool and rains abundant. The apples grown there keep well and are of excellent flavor. But passing on northward, as I was then on my way from the pecan orchard in Louisiana to my home in Washington, D. C., I stopped to again and more carefully inspect the orchards about Stuart, Virginia, which is near the North Carolina line and in Patrick County. I had been there eight years before and spent a week looking over the country and the orchards. One orchard farm, back from the railroad nearly twenty miles and near the crest of Blue Ridge, had been producing apples that had taken many prizes at the fairs in competition with those of New York and other Eastern states, and I wanted to see the trees. This I did, and was delighted with them and the soil in which they stood. This and the cool, moist climate was the secret of success, aside from good varieties and thorough culture. The owner is Mr. George Via, and he deserves credit for what he has done for his state and himself as well.

The Rangely orchard is one of the best of the older apple orchards about Stuart. It was planted by Colonel Rangely, formerly of New York, and is largely of Winesap, Ben Davis and York Imperial. The oldest trees are some thirty years planted and the younger ones not much past six years. They have been wisely and faithfully cared for generally speaking, I think, from their appearance. They have not

been over-pruned or under-sprayed. The yield of apples has been ample, and the future of this orchard is bright. At the time of my visit there eight years ago there was a large orchard contemplated, and I looked over the tract of some eight hundred acres, and liked it well. At a meeting of those interested I helped in the forming of the company and the plans. Since then there have been planted five hundred acres, and the older trees are in bearing. It is known as the "Stuart Orchard," and is one of the most valuable young orchards I know. The varieties are the best for that region, and largely Stayman, York Imperial, Winesap, Grimes, Black Ben and Rome Beauty. On the higher part are some Newtown trees and a splendid peach orchard of some forty acres. A few trees of Bing and Lambert cherries have been planted at my suggestion, and they are sure to do well, for there are old seedlings of sweet cherry trees of stately size on the property that bear heavily and regularly. There is access to the railroad about two miles away and an easy down grade all the way. Just east of this, the Stuart Orchard, lies another tract of about six hundred acres that is even of better character for orchard purposes. It has the same general south-eastern slope and the land is rolling

without being steep, except in a very few places. At one corner and at the head of a rushing trout stream is one of the famous mountains coves of about forty acres that produces the Newtown, or Albemarle Pippin. The land lies rather steep, but the soil is deep and exceedingly rich. On this splendid site will be planted another orchard of over four hundred acres, with the most approved varieties, and that very soon. The cove will be set to Newtown and the rest to Stayman, York Imperial, Winesap, Delicious and a few other standard varieties. Within the last few days the company and capital have all been arranged. I will have an interest in it, and hope to see one of the best orchards in the country growing there before the next two years pass by. There is ample and never-failing water in the trout stream that flows through the property to develop electric power to move and light everything needed. By a system of underground pipes, such as the Stuart Orchard now has, the spraying will be done by gravity from springs that put out from the mountain range immediately to the northwest. Water and sunshine will thus be turned into wealth, and at no cost to the world that grows under the oppression of the speculators.

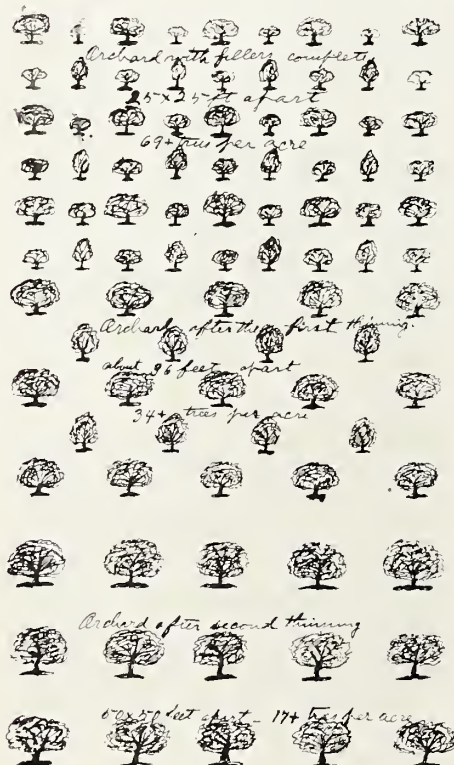
## A Superior Orchard Plan

By Professor H. E. Van Deman, Washington, D. C.

**D**URING the last year there have been several instructive articles in "Better Fruit" about orchard plans and ways of laying them out. After carefully looking them all over and comparing them with each other and with others that I have known for many years past, I feel that more can be

written on this subject that would be of advantage to those who are planting orchards. Some of the plans and methods of planting described I have tried out practically, and all the others I have seen demonstrated. Some of them in hundreds of places and with many kinds of fruit trees, and from one coast to the other. I am always looking for something better than what we already have. Now and then a good idea is suggested or an improvement seen, and I think it both duty and pleasure to let others know of anything of the kind.

In the spring of 1871 I began planning orchards of my own and the next spring I had them well started on my Kansas farm. The hexagonal plan appealed to me as the most economical and practicable, and I followed it throughout. The filler system I have devised, by which early bearing varieties of apples were to be set between those that were desirable, yet later coming into the fruiting stage. If anyone else had thought out and worked out this plan before this time I have never heard of it. I also had a fine theory about growing peach trees as fillers in apple orchards, and this I put into practice in one of my orchards. After a few years of experience my theories had to be readjusted to suit the facts. I had planted the permanent apple trees two rods, or thirty-three feet apart, and the fillers between them, which made the completed orchard stand one rod apart. This was right enough for the conditions in Kansas,







The Olson Orchard Coal Heater in Action in the Grand Valley, Colorado  
Manufactured by The Colorado Fruit and Commercial Company, Grand Junction, Colorado

where the trees stood, but the problem of thinning out the fillers had to be solved, and to take out a part of them would not leave those remaining equally distant apart, as anyone can easily see by making a draft of the plan. This was an objection that I did not fully foresee, and I had to make the best of it. During a long talk with my old friend, Fred Wellhouse, the great apple king of Kansas, we devised a plan that has since withstood the test of time, and seems to be without a fault. If there is one I am ready to see it and make any change that may seem to be for the better. The hexagonal system had to be abandoned entirely and a system of planting in plain squares adopted. From a system of equilateral triangles the change was made to a system of equilateral rectangles. Theoretically the trees may seem to cover the space more economically, and certainly do so more evenly, but practically there is no difference for the roots ramify the entire soil between the trees and the branches fill all the air space that they should occupy, and leave sufficient light to varify the foliage and color the fruit.

The plan may be very properly called the progressive filler system because of the ease and practicability of working it out from start to finish. The accompanying diagram will show it almost at a glance. The plan is made after the most simple fashion, in plain squares, and it does not matter if the rows run square with the work or at any desired angle to suit the location of the orchard. The distance apart may and should differ according to the kinds of trees and where they are to be planted. For most fruit trees, and over the greater part of the country,

twenty-five feet is the proper distance apart. This I have decided after many years of practice and careful study of orchard trees of many kinds planted at distances and in all sections of the country. It is the ideal distance for apple trees unless it be in the prairie states, where they bear very early and die soon from this cause, and from the severe weather and violent changes of temperature, and from humidity to aridity. I once thought twenty feet to be space enough and advocated planting apple trees that distance apart, but after more experience and observation

I am sure that twenty-five feet is much better. It gives more room for the trees to spread and allows the fillers to stand and bear several years longer than they could if they had less room. When the branches show that they will soon come together between the rows a part of the fillers must come out, and there must be no delay about it until they do come together or serious injury will be the result. It hurts fruit trees to even show by their growth that they are afraid of each other, for this is positive evidence that there is trouble between them. There is a struggle going on for room for full development, and both are the worse for the fight. By cutting out each alternate diagonal row, or one-half the orchard trees, the remaining will be nearly thirty-six feet apart, and there will be ample room for the trees to grow and bear for at least ten years longer. After that time has passed or whenever the signs of too close approach are seen all the remaining fillers must be taken out, leaving only the permanent trees, and they will be fifty feet apart. This is ample room for full development to old age. These stages of gradual growth and thinning out of the fillers are shown in the diagram. If only one variety is planted in the orchard the trees will be equally as well benefited by the thinning as if two or more varieties are planted, but the opportunity for mixed planting is excellent. Cross-pollination is a well determined fact, and its benefits are evident to all who have intelligently followed the practice of inter-planting varieties. For pear, cherry and peach trees twenty-five feet apart is a good distance, although many would think it to far, and this would be true of dwarf pear trees and for peach trees in regions where they do not grow to large size. Sweet cherry trees will



Photograph Copyrighted 1909 by F. E. Dean, Grand Junction, Colorado  
Mr. J. L. Hamilton Lighting the Hamilton Reservoir Orchard Oil Heater  
Manufactured by Hamilton Reservoir Orchard Heater Company, Grand Junction, Colorado



need the thinning out of at least one-half of their number, or the first stage, as has already been described for apple trees, and in some sections they grow to such large size that they will require at the second thinning fully fifty feet of space. When I was in the olive orchards of California and Arizona last year I noticed that this system and the twenty-five feet distance with progressive thinning would work splendidly. It is also just right for orange, lemon and pomelo trees, and I am growing them in this way very successfully in Florida. It is a very common and serious blunder to plant and continue to grow these citrus fruits too closely, and to the injury of both trees and fruit.

One of the mistakes that I made by following an untried theory was injuring an apple orchard by growing peach trees in it. The theory of early bearing and profits from peaches is all very nice, but the practice is bad. Peach trees are more rampant growers than

apple trees, and their roots rob those of the apple trees to an injurious extent. Besides the little experience of this kind that I had years ago I have seen thousands of orchards since in which the same mistake had been made by others. Apricot trees are even worse than peach trees in an apple orchard because they are more greedy growers. Plant them in separate orchards for the above reason, and also because they need different culture and spraying. There is no good reason, so far as I can see, for planting the two together. They will occupy no more ground if on separate plots than if inter-planted. Apple trees of early bearing varieties will produce returns soon enough, and the peach or apricot trees can be planted on an adjacent tract if desired, and the grower can have the fruit to sell from them standing there as well as if they were between the apple trees, and without the objections I have mentioned.

## The Art of Summer Pruning

By W. S. Thornber, Chief Department of Horticulture, Washington State College

**P**RUNING of trees and plants has been practiced as an art ever since plants have been cultivated, but like many other agricultural arts, the countries and districts to which fruit growing has been carried have differed so materially from where the fundamental ideas were conceived that in reality new fundamentals for the art of pruning have been developed. When the early writer said "prune when your knife is sharp and always keep your knife sharp" he did not take into consideration the effect that pruning at different seasons of the year would have upon the tree or plant.

The real purpose of summer pruning is to check the naturally rampant growth of your young fruit trees on the rich, virgin soils and hasten the period of profitable fruit bearing. Very little consideration has been given to summer pruning in most fruit growing districts of the East for the reason that land generally used for fruit was cheap, practically worthless for anything else, and that it was an

established fact that a tree could not be made to bear fruit before nature, in her slow way, intended it should. The high values of Western orchard land, and high cost of bringing orchards into bearing, compelled man to seek early returns. Certain naturally tardy, shy bearing varieties, when planted on deep, rich, moist, clay soils of the Pacific slope, under normal conditions, delay the bearing period even more than the same varieties in the East. I have known of Northern Spy trees eighteen and nineteen years of age that have never fruited, this, of course, is absurd and cannot be profitably tolerated.

Practical fruit growers now recognize the general law that heavy winter pruning tends to develop wood growth, while heavy summer pruning tends to develop fruit buds and fruit. Theoretically this statement is true, but practically it is not, as it is possible to secure just as heavy wood growth by pruning in June as it is by pruning in January. In fact, under Western conditions, I frequently favor the May or June pruning to the January pruning. Under very favorable conditions both January and June pruning are advisable for the production of wood. This is especially true with strong growing varieties of both apples and pears when one desires to avoid long pole-like branches and hasten the fruiting time of certain trees. On the other hand, it should not be practiced on weak, tardy growers. The reader will readily see that the so-called summer pruning may affect trees in diametrically opposite ways, and produce wood under one condition and fruit buds under another. To differentiate and intelligently practice summer pruning the pruner must have an intimate knowledge of tree growth in his particular district and be more or less



Figure 2—Another very light bearer partially corrected by summer pruning. While pruned at the same time as the former, yet it was too early for this naturally late grower, as is illustrated by the long twig growth and the rather light formation of fruit buds.

familiar with the habits of the varieties. No specific dates for particular sections can be set when summer pruning for the formation of fruit buds should be done, but dependence must be placed upon the variety, the district, the method of culture and the season. In Eastern Washington, during normal seasons, on the uplands where irrigation is not practiced most varieties give good results if pruned after the tenth of August and before the tenth of September; while in the irrigated valleys, where the seasons are longer and the summer temperature higher, August 20 to as late as September 20 is about right. In Western Washington, where the growing season naturally closes earlier even though killing frosts do not come before very late, the non-cultivated orchards are ready to prune as early as July 10, while the cultivated orchards may not be ready for summer pruning before August 1 to 15. The final judgment as to the time to do summer pruning must be based upon the condition of the tree. The pruner should anticipate the beginning of the period for the formation of fruit buds and begin to prune at once. This formation period for bearing trees can be accurately determined by means of a high power microscope, but practically determined by an examination of fruit buds. As a general rule, for the best results, the pruning should be done just at the close of the vigorous summer growth, while the tree is storing up reserve food, forming buds and developing



Figure 1—Sixteen-year-old apple tree summer pruned at just the right time for the formation of fruit spurs. Previous to 1907 this tree had produced very light crops. Two severe summer prunings corrected the evil.



Figure 3—A sixteen-year-old apple tree which has been given a good, reasonable pruning every January for the past nine years. Its average annual crop is less than one box of fruit. Two good, thorough summer prunings will change this tree from a brush producer to a profitable tree.





Photograph Copyrighted by F. E. Dean, Grand Junction, Colorado  
The Troutman Orchard Oil Heater in Action  
Made by The Round Crest Orchard Heater Company, Canon City, Colorado

them for the coming year's growth. If pruned too early the naturally dormant newly formed buds develop short, tender laterals which frequently perish during the winter, while if pruned too late only strong buds are developed for the coming spring's wood growth.

Practically the same principles are carried out in summer pruning as in winter pruning, only it usually requires a little more nerve and decision to remove the same amount of wood during the summer time as during the winter time. Especially is this true when the branches are laden with half-grown fruit because very few men realize the actual limitations of an average bearing tree. If the tree is old and has a dense top open up the center to permit sunlight and air to enter. Thin out the sides by removing from one-tenth to one-fourth of the branches, always cutting back to a limb and never leaving a long stub to die or throw out a big crop of sprouts. Summer pruning cannot be profitably practiced on old, stunted, dying trees, as they need rejuvenation which comes with winter pruning, but may be profitably practiced upon old, thrifty, shy bearing trees. Large limbs can be removed at this time just as safely as at any other season of the year, only it is not advisable to remove too much of the top at once. Where great quantities of wood must be removed it is better to distribute its removal over a period of from two to three years rather than entirely unbalance the tree's growth. To properly summer prune a young tree one need pay little attention to the small, slender twigs on the inside of the framework. These are naturally tardy growers, and while they can be made to bear earlier, the important work consists in cutting

back the upper, stronger leaders and lateral branches, removing from one-third to one-fourth of the present season's growth. All limb growth should be checked; to cut some back and permit others to grow gives advantage to those left. Study the framework of the tree carefully and prune each main branch just as you would a small, independent tree, removing from one-third to one-fourth of the present season's growth. Where desirable cut to outer buds, and never shear the top even, but cut each limb according to its vigor and vitality. It is sometimes necessary to thin the framework, however severe thinning should not be practiced. The practice of breaking or

bending over shoots is an old one, and where a few trees are to be treated may be profitably employed, but if the leaves wilt and die they serve as an excellent breeding place for all kinds of pests and present a very unsightly appearance. A better plan would be to weight down the limbs by attaching light weights to their ends.

Sweet cherry trees of bearing size and age should be gone over very carefully immediately after the fruit has been harvested, and all diseased, injured or surplus limbs removed at once. If the tree is making a vigorous growth it should be checked and compelled to prepare buds for the next year. Heavy winter pruning of bearing trees is always accompanied by more or less risk, and should be avoided as far as possible. Summer pruning checks the growth at a season when there is the greatest risk of an outbreak of blight and should be made one of the real methods of eliminating the blight. When there is greater danger from winter killing of peach trees than from late spring frosts, then summer pruning becomes very advisable. But where late spring frosts are the important factors keep the tree growing as late in the fall as possible and delay the formation of the fruit buds, even until early winter, thereby compelling late rather than early blooming.

In conclusion, I consider summer pruning one of the important factors to be taken into consideration in the development of uniform trees and heavy annual crops, even with our most tardy or shy biennial bearers. The most serious obstacle to summer pruning generally is that it comes at a season of the year when labor is scarce and particularly high. I have no suggestions to offer for this beyond the statement that our experiments demonstrate that it will pay, even though the cost be several times greater than that of winter pruning.



Crystal Springs Farm, C. E. Mincer, Manager, Hamburg, Iowa  
Picture taken during the time of the freeze last spring. Oil pots used. The photograph was taken in the morning, when the temperature outside of the orchard was 24 degrees and everything covered with heavy killing frost. Inside orchard temperature was 33 to 36 degrees, and leaves were wet with dew. The entire crop was saved.



# Special Varieties for Particular Sections of the Northwest

By W. S. Thornber, Washington State College, Pullman

**B**EFORE attempting to discuss this phase of fruit culture I wish to state that I would not have any grower feel that I desire to lay down rules for him to plant by; that is not the purpose of this article, but would offer this suggestion as a general guide for those who need help. The idea of this article was emphatically forced upon me while critically studying the various exhibits of apples at the three national shows held in Spokane. I simply wish to place before you a few facts which are of interest to me, and while not entirely to my own liking, and possibly yours, they are nevertheless facts of which notice should be taken.

It is almost impossible to formulate a perfect conception of how varieties behave under different conditions by studying them in their respective places of growth. However, when brought together it is comparatively easy for even a novice to study by comparison. I desire to present to you the results of a study of this kind with such additional notes as I could secure, and believe that it will be of value for the future plantings in the Northwest. Before taking up this study let us get a conception of the factors that influence fruit growing in the various fruit districts of the Northwest. Fruit men everywhere are recognizing that there are certain conditions that naturally influence the growth of certain varieties, and so we have come to recognize the proverbial recommended fruit list of each state, and occasionally for each district. Many of these lists are made up from personal likes or dislikes of the growers—good in some cases, but not always to be relied upon commercially; others are made up by office men from nursery catalogues or books written twenty to thirty years

ago for conditions three to four thousand miles from here.

The following factors or possible combinations of the same very largely influence the behavior of varieties in a given section: (1) Soil: A heavy, rich, wet soil delays fruiting from one to five years and then frequently produces poorly colored fruit. A light sandy loam or sandy volcanic ash hastens fruiting even to a detrimental degree under some conditions, while the extremes of soil moisture or lack of moisture change the texture and palatability of the fruit. (2) Climate: The summer climate has much to do with the ripening period of the fruit, thereby materially changing its shipping habits. A long, hot summer, particularly at a low altitude, ripens fruit from two to three weeks earlier than a cool climate in a higher altitude. (3) Altitude: Very little is known about the effect of altitude upon certain varieties beyond the fact that above certain heights some commercial sorts become shy bearers, or produce at best very inferior fruit as to size, color and shape. The higher altitude fruit is later, ships better and when properly handled has better texture than the lower altitude fruit. (4) Temperature: The extremely cold winters of some regions entirely eliminate certain tender sorts, particularly if they produce a late fall growth. While not common to many sections, it is true of the Rome Beauty, Spitzenberg and similar sorts in a few sections. (5) Amount of Sunshine: The total amount of absolutely clear sunshine common to a section during the latter part of the summer and early autumn very largely decides the advisability of certain varieties. If hazy or smoky weather annually prevails for a long period of time, then the dark red sorts should be eliminated to a very large degree. Eastern growers very frequently attribute our rich colors to the long hours of sunshine, and while this is largely true, the sunshine is only one of the many factors. (6) Length of Growing Season: A long, unbroken growing season, if not too closely followed by severe or cold weather, gives ideal orchard conditions. If hard freezes follow the fall weather closely, or winter sets in before the trees have had an opportunity to prepare for fruiting, wood is sure to result.

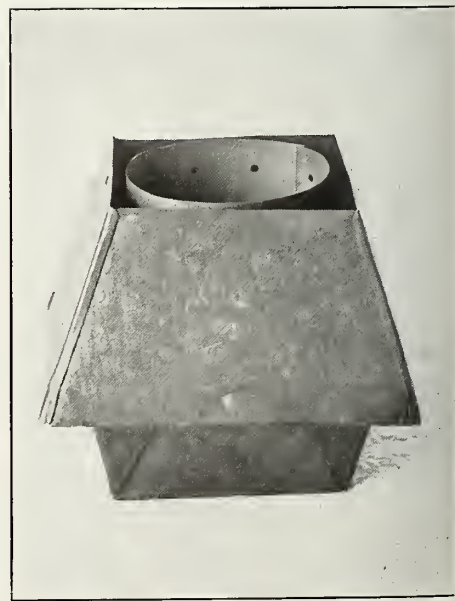
While most of our fruit sections vary distinctly, yet there are relationships existing among these varieties which makes it possible to group certain varieties together for certain combinations of natural conditions. We have come to recognize four distinct horticultural regions in the Pacific Northwest; true it is that there are many local variations, but the general factors are fairly uniform for these groups of districts or valleys. The

Coast region, or that part of Washington, Oregon and British Columbia west of the Cascade Mountains, is characterized by a rather heavy clay soil, an altitude varying from sea level to four hundred feet above, a rather even temperature with few striking variations or extremes, a heavy annual rainfall, most of which comes during the winter months, and the summers are generally dry, a long growing season; and while a lot of sunshiny weather, the autumns are generally hazy, which, to a limited extent, prevents the highest possible coloring of the fruit. A region with factors of this kind is particularly well adapted to such varieties as Olympia Baldwin, Northern Spy, Ortley, Yellow Newtown, Glowing Coal and Wagener. By a comparison of these fruits one will readily see that they, with the exception of the Wagener, have a common origin in rather low altitudes, and generally in clay soils. It will be seen later that the Wagener is one of our cosmopolitan fruits and has few limitations. The other varieties are limited to certain groups of factors or conditions and cannot be successfully grown in regions where the conditions are strikingly opposite to those of the Coast region. The Northern Spy and Olympia Baldwin become very shy bearers at high altitudes on deep, rich but rather dry soils, and the Ortley and Yellow Newtown, while generally juicy and crisp, become dry and woody under similar conditions.

The inland valleys region of Central and Eastern Washington, Oregon and British Columbia, and Eastern and Southern Idaho are characterized by a light, sandy to volcanic ash, or even a gravelly loam soil, an altitude varying from 350 to 1,400 feet, a very light annual rainfall, long growing seasons and the maximum amount of sun-



Troutman Heater



National Orchard Heater





In the Shade of the Old Apple Tree

Press representatives with the Southern Oregon demonstration train at Merlin, Oregon, March 25 1909. This apple tree is now fifty-six years old and still bears fruit. Planted in 1853 by the Haines family, who were later massacred by the Indians

shine and mild, pleasant winters. Districts with common factors of this kind will produce Winesaps, Spitzenbergs, Yellow Newtowns, Arkansas Blacks, Jonathans, Grimes Golden, Rome Beauty and kindred sorts of the highest grades of apples, providing good cultivation and reasonable treatment be given. If the valley is too warm and the season forced too much early winter sorts do not color sufficiently before they have to be picked, and are very apt to ripen before they normally should. While on the other hand, if the soil is too deep and rich and an abundance of water is used, the Spitzenberg, under normal treatment, may become a shy bearer or producer; only occasional heavy crops of well colored fruits grow in sections of this kind. Experience shows greater difficulty in the selection of commercial fruits for these valleys than any other in the Northwest, inasmuch as any variety will grow and produce good fruits, but which is the best is always hard to determine. The McIntosh Red, when grown under these conditions, is probably the most perfect apple for desert use for a short period of time, but the great difficulty is that instead of remaining a winter fruit it becomes an early fall fruit, and soon passes its season. If certain apples of the group particularly adapted to the valleys be planted in high altitudes where the seasons are short, they fail to color, produce size and attain development. Others become shy bearers, while still others take on abnormal characteristics. The Winesaps do not attain sufficient size, while the Yellow Newtowns vary in size, color, form and texture. The Rome Beauty is not seri-

ously affected because it is more or less of a cosmopolitan fruit.

The inland upland regions are characterized by a deep, rich, basaltic or even loamy soil, moderate amounts of rainfall, dry, warm but not extremely hot summers, an altitude varying from 1,200 to 3,000 feet above sea level, comparatively short growing seasons and long but not severe winters. This type of country is adapted to a comparatively short list of orchard fruits. It is essential that varieties that succeed here be sorts that attain their growth early in the season. Late maturing sorts are not adapted to those conditions. Such varieties as Jonathan, Rome Beauty, Wagener, York Imperial, Gano and Black Twig attain a degree of perfection that is highly desirable for long keeping shipping fruit. Very frequently autumn sorts, in most sections, become early winter sorts in this region if they are properly handled. While some of the later sorts become extremely late under favorable conditions. It is almost useless to attempt to grow commercially such varieties as Northern Spy, Spitzenberg, Rhode Island Greening and kindred sorts, as they almost cease to bear. We have a few definite records of these varieties which show an average of less than one box per tree during the past six years from trees twelve to sixteen years of age. Varieties like the Winesap, Ortley, White Winter Pearmain and Yellow Newtown require entirely too long a season for regions of this kind, and occasionally such sorts as the Ben Davis become veritable corks or blocks of wood when grown here.

The mountain regions are characterized by deep gravelly loam, light

clay loam bearing more or less gravel or volcanic ash soil, comparatively short growing seasons, a minimum amount of rainfall, warm in summers, frequently very cold winters, very high altitudes, frequently ranging from 3,400 to 5,000 feet above the sea level, and plenty of sunshiny weather during the summer and autumn days. The number of commercial varieties for these sections are, of course, limited, especially in sections where the cold winters cut out the more tender sorts. Commercial work has progressed nicely in these cold sections by planting Jonathans, McIntosh Reds, Wageners and Wealthy. The high altitudes and climatical conditions have completely overcome the earliness of these naturally early sorts until now we frequently find them keeping late into spring. The cold winter appears to have little or no effect upon them when properly treated, and the seasons are sufficiently long to develop all that is desired. The warmer, milder high altitudes are producing Jonathans, Rome Beauty, Wagener and various other sorts of commercial value. The battle is one of attaining sufficient size for some of our common sorts. One particular condition that might exist in almost any of these regions is that of extreme drouth where irrigation is impossible and the conservation of moisture must be resorted to by means of cultivation. In sections of this kind no late developing varieties of fruit should be planted, as the drouth of the later part of the season is sure to interfere with proper maturity. Such apples as Rome Beauty, Yellow Bellflower and York Imperial for winter use, McIntosh Red, Duchess of Oldenberg, King of Tompkins County and Wolf River for fall use, and Yellow Transparent and Red June for summer use are practically all that can be depended upon to do anything where severe drouth, without irrigation, exists.

The Northwestern Harmony.—Careful perusal of the foregoing will show that the Northwest is probably the best all around balanced variety fruit district in the world. All of the high class commercial sorts are at present grown to a degree of perfection not excelled anywhere, and so systematically divided into groups for different regions that, while state vies with state, or district with district, the competition among ourselves need never reach that stage that will be serious to one another. The regions described present vastly different conditions in the production of first class fruit. Each produces a higher grade of fruit of a few well chosen varieties than it is possible to produce in any other region with the same varieties. However, there are certain varieties that are more or less cosmopolitan and can be grown to a high degree of perfection almost anywhere in the Northwest.

Cosmopolitan Varieties.—There are comparatively few fruits that enjoy



the distinction of being so-called Western cosmopolitan fruits; however, the Rome Beauty, Wagener and Yellow Bellflower apples belong to this group, grown as they are practically all over the Northwest at high and low altitudes, wet or dry, and with culture and without culture, if any apples grow these will. This same thing is true to a certain extent of the Bartlett and White Doyenne pears; while they will not stand the same abuse that the apples will, in all cases they are grown if pears grow at all. The peach plum, Italian prune and the Yellow Egg plum are also not seriously particular as to their choice of region, just as they are given a chance to grow. There are a great many apples being planted in the West which are adapted only to very limited localities. Extreme care should be used in extensive plantings of these sorts until thoroughly tried and their commercial merits demonstrated. When well grown they have few strong competitors, but if poorly grown they are almost worthless to the trade.

Pears.—The behavior of commercial varieties of pears under different conditions has not been as closely studied as it should. However, general recommendations can safely be made from the information at hand. The Bartlett pear is generally recognized as one of our most cosmopolitan fruits and does well at all altitudes under normal conditions, with the exception of sections that are extremely dry just previous to and during the ripening season. In these sections the fruit is under sized, contains a surplus of stony tissue and is of unsatisfactory quality. Winter Nelis is not so cosmopolitan in nature, but does well under most conditions. In Western

Washington, where russeting is common, it frequently becomes entirely covered with russet, while in other sections it may have only a lacing of russet. It must have sufficient water to finish upon or it becomes entirely too small for commercial purposes. The Comice and Anjou are two of our highest class pears, very satisfactory in most sections but rather tardy bearers in all sections. However, after once coming to full bearing, they give satisfactory yields. The Clairgeau and Boone de Jersey are not as commonly grown as many sorts, but are especially valuable orchards west of the Cascades and in sections where there is plenty of moisture to finish upon. In addition to these varieties there are many more that can be satisfactorily grown, but are not well known in commerce.

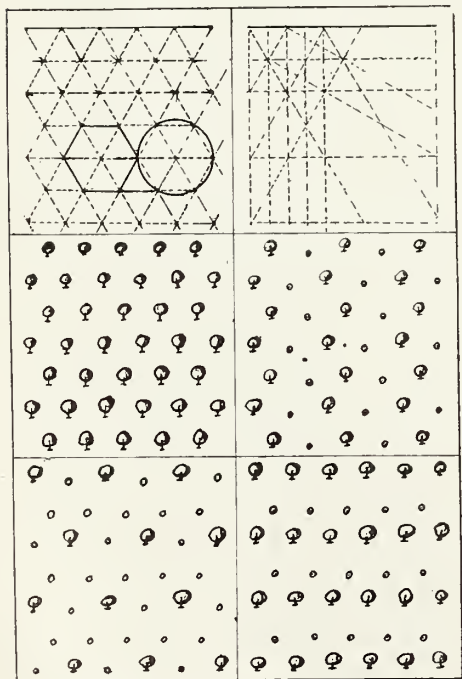
Cherries.—Commercial cherry culture is limited more or less by cold winters and late frosts; however, the Bing and Lambert are doing well in most of the fruit districts. These are the best all purpose black cherries that are growable in practically all sections. The Royal Ann is the most popular white or light cherry grown, but tenderness in bud and wood prevents its use in any section that has cold winters or very severe late spring frosts. The Royal Ann is supplanted in the colder, more severe locations by the Vilne Sweet cherry, a light colored, very hardy sweet cherry imported from Russia. While productive it is not a first class shipper, nor is it of high quality, but is especially valuable for regions where the Royal Ann cannot be grown. If the Royal Ann can be grown do not plant the Vilne Sweet, as there is no comparison between the two from the quality point of view. Black Republican and Black Tartarian are two more very popular varieties for mild climates, but cannot be grown in high altitudes where the winters are severe, nor on the uplands where late spring frosts are common, as they are very tender in both fruit and bud and blossom. The May Duke, Late Duke and Reine Hortense are all comparatively hardy, resistant sorts of the Duke type and can be grown where it is impossible to grow the sweet sorts. As a fruit of high quality these varieties are taken by many in preference to the sweet sorts. They are not good shippers, but are excellent bearers. The sour cherries have many first class sorts adaptable to Western conditions and growable almost anywhere. The Olivet is by far the most popular both as a home orchard and the commercial sort. Other good sorts are the Northwestern and Dye-house.

Grapes.—The cold uplands of the Inland Empire and the unfavorable slopes of Western Washington and Oregon are limited to a very small number of varieties that will mature early enough in the fall to warrant the general planting of the crop. The

European varieties are rather tender unless well protected during the winter in sections of this kind. Moore's Diamond, Moore's Early, Campbell's Early and Empire State are the best varieties for unfavorable locations, and should always be planted on southern slopes. In the warmer valleys the Worden, Niagara, Concord, Delaware and many other high quality American sorts can be profitably grown. The Alexander-Muscat, Flame-Tokay, Rose of Peru, Black Hamburg, Sweet Water, Thompson's Seedless and many other European sorts can be commercially grown in nearly all of the low altitude, warm irrigated valleys. However, very few sections are absolutely safe for European grapes without winter protection of some kind. While they will stand the winter weather of most years occasionally they will freeze to the ground, or at least to the snow line.

The following is the recommended list of the Washington State College, arranged and issued by the writer. While it has never been issued in bulletin form, yet thousands of copies have been mailed to the prospective planters of the West. Local conditions very frequently make it possible to vary it considerably, yet the general plan is a safe one for commercial planting. The letter following the name indicates the season of the variety—"E" early, "M" medium, "L" late:

Apples—Western Washington: Northern Spy (L), Olympia (L), Glowing Coal, Yellow Newtown (L), White Winter Pearmain, Yellow Bellflower, Wagener, Gravenstein (M), King (M), Ortley, Yellow Transparent (E), Williams (E). Inland Valleys: Spitzenberg (L), Yellow Newtown (L), Rome Beauty (L), Winesap (L), Jonathan (L), White Winter Pearmain (L), Gravenstein (M), Duchess (M), Grimes Golden (L), King (M), Yellow Transparent (E), Winter Banana, Williams (E), Delicious (L). Inland Uplands: Rome Beauty (L), Wagener (L), Jonathan (L), White Winter Pearmain (L), Gano (L), York Imperial (L), King (M), Grav-



Hexagonal System of Planting

- 1, Field staked by use of triangle; 2, Field set;
- 3, Field properly thinned; 4, Field partly rowed off by running lines; 5 and 6, Improper thinning.

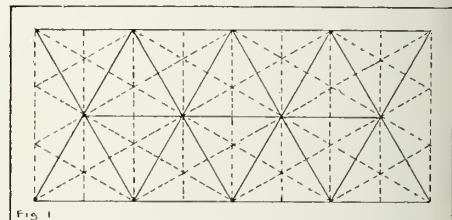


Fig. 1

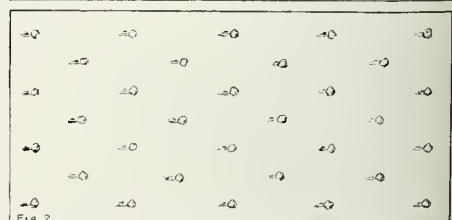


Fig. 2

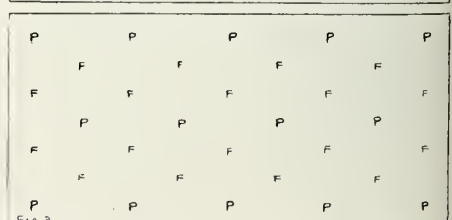


Fig. 3

Figure 1, Field marked for hexagonal planting. Large triangles indicate which trees are permanent. Figure 2, Orchard planted. Figure 3, P indicates permanent trees, F filler trees.



enstein (M), Duchess (M), Yellow Transparent (E), Winter Banana (M), Williams (E).

Pears—Western Washington: Winter Nelis (L), Clairgeau (L), Anjou (M), Comice (M), White Doyenne (M), Seckel (M), Bartlett (E), Clapp (E), Flemish (M). Inland Valleys: Winter Nelis (L), Clairgeau (L), Anjou (M), Comice (M), White Doyenne (M), Seckel (M), Bartlett (E), Clapp (E), Flemish (M). Inland Uplands: Winter Nelis (L), Clairgeau (L), Anjou (M), Comice (M), White Doyenne (M), Seckel (M), Bartlett (E), Tyson (E), Flemish (M).

Sweet Cherries—Western Washington and Inland Valleys: Royal Ann (E), Bing (M), Hoskins (L), Lambert (L), Black Republican (L). Inland Uplands: Bing (M), Centennial (M), Hoskins (L), Lambert (L), Vilne Sweet.

Sour Cherries—All sections: Olivet (M), Northwest (L), Montmorency (M), Early Richmond (E).

Dukes—All sections: May Duke, Late Duke, Reine Hortense.

Peaches—Western Washington: Alexander (E), Triumph (E), Early Crawford (E), Charlotte (E). Inland Valleys: Elberta (M), Foster (M), Hills Chilli (M), Salway (L), Early Crawford, Late Crawford, Hale (E). Inland Uplands: Alexander (E), Triumph (E), Wonderful (M), Champion (E), Hale (E), Early Crawford, Foster (E).

Apricots—Western Washington and Inland Uplands: Gibb (E), Moorpark (E). Inland Valleys: Royal (M), Hcmiskirke (M), Early Golden (E), Moorpark (E).

Plums—All sections: Abundance, Bradshaw, Peach, Wickson.

Prunes—All sections: Italian, Silver, Hungarian.

Grapes—Western Washington: Concord, Niagara, Worden, Campbell's Early, Moore's Diamond, Moore's Early. Inland Valleys: Campbell's Early, Moore's Early, Moore's Diamond, Concord, Worden, Delaware, Sweetwater, Thompson Seedless, Tokay (Flame), Hamburg, Alexander. Inland Uplands: Moore's Early, Campbell's Early, Moore's Diamond.

Raspberries, Red—Western Washington and Inland Valleys: Cuthbert (M), Antwerp (E), Marlboro (M), Superlative (M), Ruby (M). Inland Uplands: Cuthbert (M), Marlboro (M), Ruby (M).

Raspberries, Black—All sections: Cumberland, Burkhart, Gregg.

Blackberries—Western Washington and Inland Valleys: Snyder (E), Mammoth Black

(E), Kittatiny (M), Himalaya Giant (L), Evergreen (L), Lucretia Dewberry. Inland Uplands: Early Harvest (E), Rathburn (M), Kittatiny (M), Evergreen (L), Lucretia Dewberry.

Gooseberries—All sections: Downing, Industry, Portage, Smith.

Currants—All sections: Victoria, Wilder, Perfection, Cherry, Red Dutch, White Grape.

Strawberries—Western Washington and Inland Valleys: Hood River, Magoon (M), Marshall (M), Warfield (E), Bederwood (E), Crescent (M), Gandy (L). Inland Uplands: Glen Mary Ann (M), Marshall (M), Warfield (E), Bederwood (E), Crescent (M), Hood River (M), Gandy (L).

English Walnuts—All sections: Franquette, Mayette.

Other Nuts—All sections: Black Walnut, Cob Filbert, Butternut, Jap Chestnut.

The table herewith shows a comparison of the scores as given by disinterested judges of the exhibits of the various districts at the National Apple Show in Spokane in 1910. Inasmuch as these fruits were selected by different exhibitors with different ideals in mind the personal difference will enter into the real value of these figures; however, it shows in a general way the value of the color, development, size and shape of each variety for several districts. The judging did not enter into the flavor, quality, texture or the internal condition of the fruit, but judged much as a retail buyer would have to measure value. This work has been done for the past four years at various shows, fairs and exhibits, and sooner or later will be compiled into one general report of the behavior of varieties under different conditions. This report, however, is taken from the scoring of the last year's exhibits.

District	Wine-sap	Yel. Newt'n	Spitz-berg	Jona-tha	Rome Beauty	Wag-ner	N'thn Spy	Stay-man	Gano	Bell-flower	Ark. Black	Bald-win	Ortley
Methow	9.5	9.5	10	10	9	9	9.5	10	10	10	10	9	9
Spokane	8	..	..	10	9	10	..	..	..	..	9	10	..
Oroville	..	..	7	9	9	..	..	..	..	8	8	10	..
Stevens County	8.5	8	7.5	10	10	10	9	7	8	9.5	9	10	..
Yakima	10	9.5	10	10	10	9.5	8.5	..	..	9	10	9	10
Prosser	10	10	10	10	9.5	9.5	9.5	10	9.5	10	10	9	10
Goldendale	9.5	10	10	9	9	9.5	10	9.5	10	9	..	10	..
Clarkston	9.5	..	9.5	10	10	9	..	..	9	..	9.5	..	..
Wenatchee	10	9.5	9.5	10	10	..	9	10	10	9	9	..	..
White Salmon	8	10	10	..	..	..	..	..	..	10	8.5	..	..
Lyle	..	9.5	10	9	9	8	..	..	9	..	8.5	10	9.5
Walla Walla	8.5	9.5	..	10	10	..	..	..	8.5	..	9	..	..
Hood River	..	10	10	..	..	..	9.5	..	..	..	..	10	..
Palouse	5	8.5	8.5	10	10	10	6	6	9.5	10	7	6	7
Western Washington	..	10	9	..	..	10	10	..	..	10	7	10	10
California	..	..	..	10	9.5	..	..	..	10	..	..	10	..
Montana	..	..	..	8.5	..	..	..	..	..	..	..	..	..
Colorado	8	..	8	9.5	10	..	..	..	..	..	..	..	..

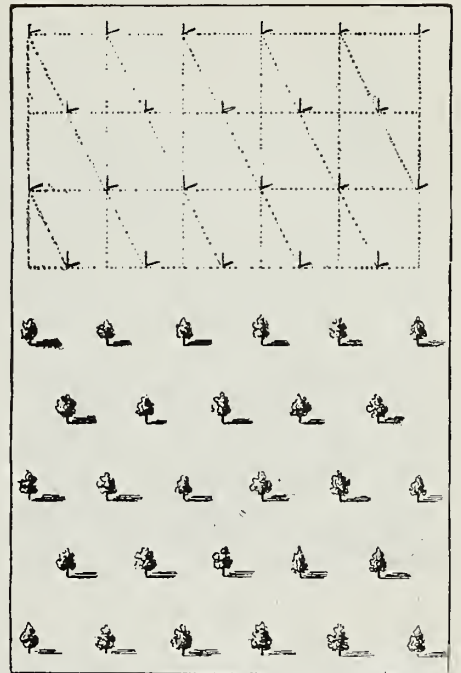
## Making Over An Old Orchard

By H. L. Jenkins, a British Columbia Horticulturist

FOR the benefit of those who may have matured trees which do not produce so much fruit as they should, I wish to present this sketch on grafting. The operation of regrafting them takes place toward the end of March, or earlier if there are signs of spring influence. Grafting differs from budding in its being the transfer of a shoot, carrying several buds, from one tree to another instead of only a single bud; and, as budding has been compared to sowing seeds, so has grafting to making cuttings. The art of grafting consists in bringing two portions of growing shoots together so that the soft woods may unite and make but one growth, and the same general principles apply to it as to budding. There are some fifty modes of grafting described in books, but

only three or four are in common use. In all methods of grafting the shoot to be transferred is called the scion and the tree that is to receive it is called the stock.

The first point in successful grafting is to secure an intimate union of the parts—not a mere sticking together, but an absolute union. The new or young layers of the inner bark must be brought into close contact and then, if the air is kept from the wounded parts until nature effects a cure, there is a perfect graft. It is obvious that the more accurate the adjustment of the line separating the wood from the bark the more ready will be the transmission of young fibers from the one to the other, and that the less the accuracy that may be observed in this respect the greater will be the diffi-

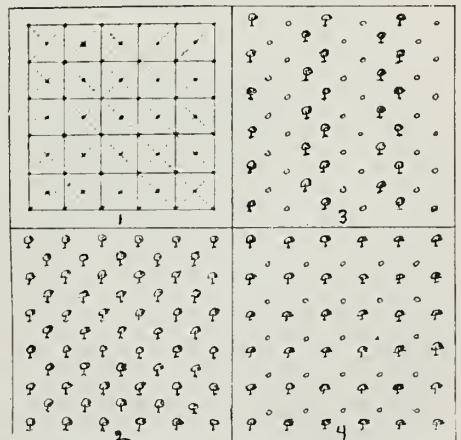


Triangular or Alternate System of Planting

culty of effecting the transmission. Providing the stock and scion are of exactly the same size the adjustment can scarcely fail to be accurate in the most skillful hands; it is in the common case of the scion being much smaller than the stock that the operation is to receive more particular attention.

There can be no question as to the utility of grafting, for by its aid a bad kind of apple or pear may be transformed into one that is good. The best season will soon be here, and, while I would not advise the working over of very old or unhealthy trees, there are those in a fair state of health, and only unsatisfactory from being inferior sorts or not suited to the district or soil, in which cases regrafting is to be commended and should have good results, as an established tree reworked will be in bearing much sooner than a young, freshly planted one.

The first process, as a matter of course, is to behead the trees to be operated upon, and in doing this the branches should be cut clean down in



The Quineux System of Planting  
1, Field staked; 2, Field set; 3, Improper thinning; 4, Proper thinning.





a sloping direction so as to throw off the wet. To assist in this and help the healing process, the parts sawn should be shaved with a sharp knife so that the wound may be smooth. As to the operation, the proper way is to make a slit right through the rind, rounding from the top down, extending about three inches and on opposite sides, making either two or four slits or cuts; which done, the next thing is to raise the bark in readiness

for the insertion of the grafts. A very ready, safe and easy way of doing this is to have a small, hard piece of wood about the size of a cedar pencil and shaved off one side, sloping down to the end, which part can then be thrust under the rind where the cut is, and it will thus be at once raised. The scions should be prepared in precisely the same manner as the stock, which they will then follow by being pushed in without being bruised, and, when inserted, should be tied so as to hold them steadily in position and prevent the bark gaping. Raffia grass or soft string is the most suitable material for tying in, and then the clay must follow. This is a preparation of clay and horse manure, well mixed together. It will be seen that there is really nothing very difficult in grafting, and if the scions have been carefully kept and clearly cut a closely fixed union will take place at once, and the scion will make a good joint and grow freely. I have actually seen bloom and fruit on a first-year graft, but this should not be allowed. The chief thing to be remembered is that the parts of scion and stock must be so cut that they fit closely together; then, if they are protected from the air and from the effects of winds by the clay ball, nature will soon accomplish the rest.

## Views from British Columbia

A RECENT letter from Mr. Wm. R. Craig of Rutland, British Columbia, enclosing the five orchard views printed herewith, will be of interest to many of our readers. The letter follows: "Having some good views taken in my young orchard, I enclose five herewith, hoping that they may be of interest or use to you. Nos. 1, 2 and 3 are views of trees planted less than four months previous to taking of photo—one-year-old, straight whip, cut back to thirty inches high. No. 1 is a Gano about six feet high (was over seven feet high in fall). No. 2 was purchased for a Gano, but is not; it was nearly seven feet high. No. 3 is a "Wisner Dessert" tree; the stick on the right is a dead tree to show the size

of living tree when planted. No. 4 is the same tree (No. 3) taken a year later from different position, with part of orchard in background. No. 5 is a Tragedy Prune planted in May, 1909, as were the others. Tree grew poor shape first year, so I pruned it back very close to where white rags are tied on. All above the rags is this year's (1910) growth. When photo was taken (in September) tree was nine feet ten inches tall; is now ten feet four inches. Rutland is about five miles east of Kelowna, in the Okanogan Valley, British Columbia. We have splendid orchard land and an ideal climate, and you are sure to hear more about us in the future. "Better Fruit" is read with profit by a goodly number of the ranchers near here."



### TOP WORKING

The best time to do top working is just about when the buds are bursting into leaves, but of course this particular period is too short to accommodate all the work that must be done, and so the agony is spaced out in this country for two or three months, as it has to be. The great secret of success under these circumstances is in keeping the scions dormant and not allowing them to dry out. A dormant scion and a sappy stub is the rule to go by. In working over a tree eight or ten years old, pick out four or five of the main prongs and graft them, but this does not mean that the work must all be done one season. Be sure to select the limbs to be grafted so as to have a well balanced top. All limbs not grafted should be left on until the following spring, when they should be cut off. These limbs should be left for leaf surface in which the sap may be elaborated. Remember, the nourishment taken through the roots cannot build up the tree until it goes out into the leaves, where it meets the sunlight and air and takes in carbon, which combines with this non-elaborated sap and forms carbohydrates and proteids, which alone can build up the tree. If everything is cut off but the grafts the tree suffers for want of prepared food. A tree without leaves will die just as sure as a man on a prospecting tour will die without grub. Stubs as much as four inches in diameter are oftentimes grafted. In such cases four scions are put in and then all but one are cut away when the healing has sufficiently advanced. The four kerfs are set equidistant.—Field and Farm.

There were a number of up-to-date portable power fruit sprayers at the State Fair at Salem, Oregon, this fall. The Reiersen portable power fruit sprayer took the blue ribbon, highest award. This sprayer is manufactured by the Reiersen Machinery Company, Portland, Oregon, and sold direct to the fruit grower. Our ad. appears on another page in this issue. \*





# The Char-Pitting Method for the Destruction of Stumps

By H. W. Sparks, Supervisor Washington State Demonstration Farms, Pullman

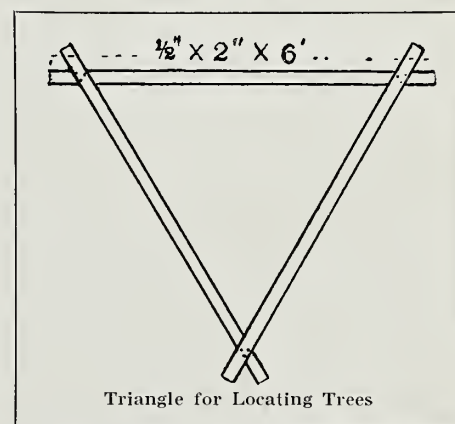
THERE seems to be a well founded report that this method was first used by some Germans in Oregon about twenty years ago, but for some unknown reason the art was lost, or rather seemed to lie dormant for several years. Rumors of the method had gone out, and we believe the later methods are due to difference of understanding of these first reports. After investigations we became convinced of the value of the method, and gave our first public demonstration of it under the management of the Extension Department of the State College of Washington during a meeting of the Cowlitz County Pomona Grange, October 28, 1909. Several demonstrations were given in different parts of the state as a part of the regular farmers' institute work. After learning that the method, while proving so successful in the clay soils, was a failure in sandy, gravelly, loam soils, we commenced some experiments at Lake Whatcom in the winter of 1909-10 with the object of learning the reason of this, but were called away from the work again before any definite results were reached. Taking up the work again in co-operation with the Bureau of Plant Industry, Department of Agriculture, Washington, District Columbia, in Sep-

tember of 1910, Mr. Harry Thompson, representing the federal department, and the writer undertook work on the farm of Mr. Henry Dupurtis at Adna in order to obtain reliable data of the costs, and to study the factors with a view of extending the system to the supposed unfavorable soils.

Later in the fall and winter I undertook a series of experiments designed to make the method applicable to stumps in soils which were too sandy or gravelly to permit its successful use without some soil binder, and other experiments to ascertain whether fuel oil or other cheap combustible matter might not be successfully and economically used in starting the fire under the stump. A report of our observations of methods of clearing land ready for destroying stumps, and of investigations and experiments with the char-pitting of stumps has been published as general bulletin No. 101 of this experiment station. This popular bulletin contains a summarized description of the char-pit method, with some experimental data as to the cost of destroying stumps by this process. For fuller details interested readers should procure a copy of this bulletin.

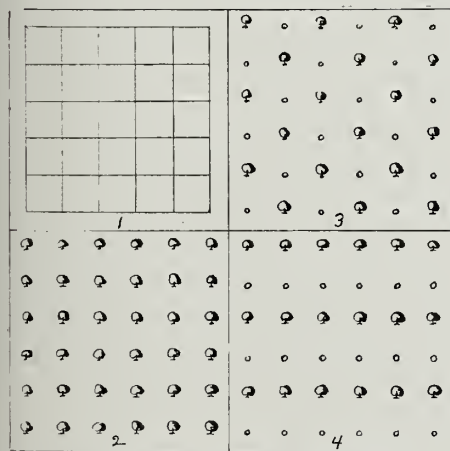
We will first give directions for the method as adapted to clay soils. Starting in after a "good burn," on the stumps, if the operator will follow as soon as the ground is sufficiently cool he will find many stumps with sufficient fire as not to require any more than perhaps a few fragments of bark or other light material added to them to secure a good start, which should be covered immediately with earth. Stumps not so burning should be treated as follows: First, remove the bark to the ground, then if the sap wood is wet or green chop into the inner dry wood. Now procure some fuel for the good start; in the dry season any half-rotted material that can be secured easily will answer, provided there is enough dry material to start the fire. Pile this fuel around the base of the stump in such a manner that the fire will follow. The fuel should be continuous and fairly uniform in quality and quantity. It does not make any difference whether the wood is set on end or laid lengthwise. Where some of the fuel is long and there is a portion of the stump where there is a side sufficiently straight to allow the piling of long pieces without leaving too much space between the fuel and the stump this may be done so as to save labor of breaking up the wood. As to the amount of fuel to be used much depends upon conditions. If the fuel is piled to reach about fifteen inches high and about the same distance out at the ground line this will be sufficient. Our experience indicates that it is best to have less rather than more kindling material if it is so arranged that the fire will burn evenly, thus allowing the cover to settle uniformly. If the fuel burns out quicker in some places than in others the cover settling down as the fuel is burned in these places leaves breaks in the cover, thus permitting the heat to escape.

will be a breaking up into the finer subdivisions of soil, which will fall into the crevices of the fuel and perhaps considerable portions of it drift in between the fuel and the stump, thus protecting the stump from the fire. Hence the best results will be secured by laying each shovelful of earth on the fuel without throwing, and if the soil shows a tendency to break up fill in around the stump at the top of the fuel with the most convenient material at hand, small pieces of bark, rotten or wet wood, ferns, twigs or anything that will hold the fine material up at the start. Build the soil covering up from the bottom and cover the top tight. Be careful at the top of this



covering to close all the holes. A few shovelfuls of finer earth sifted over this portion of the covering will be found to be an advantage. Allow the air to enter freely at the bottom, since as the burning proceeds the air becomes heated and rises to the top of the covering, where it will escape if there are any holes, but if confined within the space the cover soil becomes hot, and that heat is radiated back to the stump. If the soil covering settles down to the horizontal, or nearly so, this heat is radiated back to that portion of the stump which we wish to burn, namely, the roots; and this is the special reason for keeping the fuel down to the lowest minimum for successful firing.

Cover all the fuel except a small opening to the windward side, where some kindling should be placed for the purpose of conveying the fire around the stump. Leave this opening on the windward side of the stump so that when the wind blows it has a tendency to drive the fire in under the cover. As soon as this fire is well under the cover, which may be easily told by the operator from the amount of smoke issuing through the covering at different places, cover that opening in the same way as the rest of the fuel was covered. Sometimes if it has not been convenient to reach the newly fired stump at the proper time and the fuel has burned out pretty well at this opening, where it has been exposed to



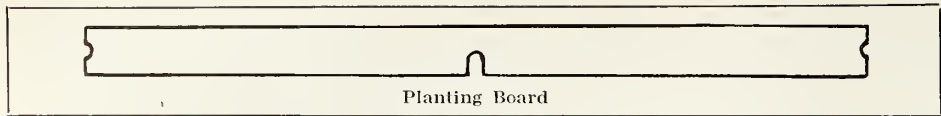
The Rectangular System of Planting

1, Field lined; 2, Field set; 3, Proper thinning; 4, Improper thinning.

tember of 1910, Mr. Harry Thompson, representing the federal department, and the writer undertook work on the farm of Mr. Henry Dupurtis at Adna in order to obtain reliable data of the costs, and to study the factors with a view of extending the system to the supposed unfavorable soils.

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the strong air currents, it may be necessary to fill in with a few small sticks or pieces of bark, which takes the place of that burned out, before banking up. The stump may now be left to care for itself for several hours while other parts of the work are done. The operator should make regular visits to each of the stumps to see that they are progressing as desired. If he finds holes breaking through the covering at any place they should be filled up, avoiding at all times packing the covering. Leave a loose, porous covering, because the more air space there is in this cover the better non-conductor it is, air being a non-conductor of heat. As a general rule the operator will find it best to arrange his work so that most of his stumps can be fired in the morning, leaving the afternoon so far as possible for the removing of bark, getting the fuel ready and fully preparing the stumps, all except setting fire to the kindling. Fire early in the morning in order that this first fuel may become burned down to a bed of coals before night, and the earth covering settled down to a position where there is less danger of breaks in the cover. Then, if these newly fired stumps are looked over as late as possible before retiring for the night, they take care of themselves until the early morning with a very small percentage of failures.

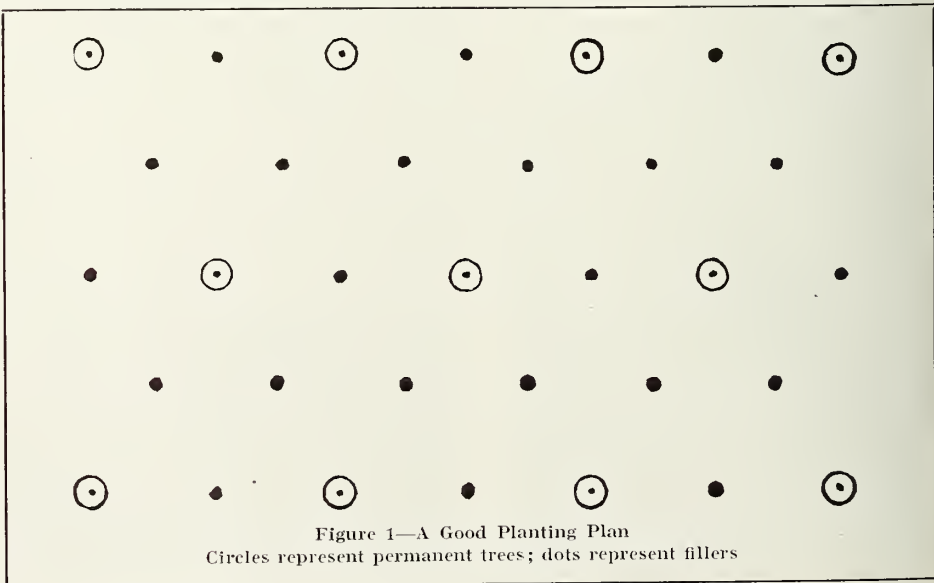
If a stump has been successfully fired, about twenty-four hours after the fire has been applied white smoke will be seen issuing from several places around the stump. At times we have thought that the fire had not caught some of the stumps, but upon examination found considerable heat there. If such stumps are left alone for a day or two the fire seems to gradually gather force by slowly drying out the wood, then begins to burn quite rapidly. From that time on the operator should visit the stumps regularly night and morning, dividing his time as evenly as possible, as it is quite essential that the stump be not left too long at one time to care for itself, as the fire burning under this cover will gradually eat into the stump and work its way from under the covering. If allowed to go too long in that condition the accumulated heat is lost through the opening. We have found that the fires usually burn better at night. The incoming air is cooler, and consequently expands more when coming in contact with the fire, thus stimulating stronger draft with more oxygen and better burning. This work is not heavy, but is exacting in its nature. Regular visits must be made to each stump, and where the fire has gone beyond or through the covering it must be covered over with more soil. It is best to cover these openings with dry, hot earth from near the fire,

replenishing from the soil outside over the top of this to keep the required thickness of earth over the fire. This should be kept as nearly as possible between two and four inches, the depth depending largely on the nature of the soil and the method the operator wishes to employ, that is, either to burn rapidly and consume most of the charcoal as fast as carbonized or to burn slowly and preserve most of the charcoal. The amount of this covering regulates the speed of burning. A fairly good guide for the operator is to watch the color of the smoke issuing from or through the covering. If the smoke is blue, moves upward rapidly and the fire can be seen through the cover, the carbon is being consumed too rapidly. This calls for more cover. But if the smoke is dense and white, and moves slowly, this indicates good work, the moisture and gases being driven off without actual burning of the charred wood, which is the desired condition. Heavy clay soil which does not break up much but retains the form as shoveled on is not as good a non-conductor as a soil that breaks up into smaller particles, hence a little more of this heavy soil must be used for the same speed of burning that would be necessary for the soil that breaks up better. On the other hand, if the cover disintegrates from the action of the heat, as sandy loam soils do, there is a tendency for this fine soil to run into the fire before it is well established in the stump and smother it. Also, these sandy loam soils, which from their nature are inclined to settle down closely together when hot, are better conductors of heat, and conduct the heat away from the stump instead of conserving it and radiating it back to the stump.

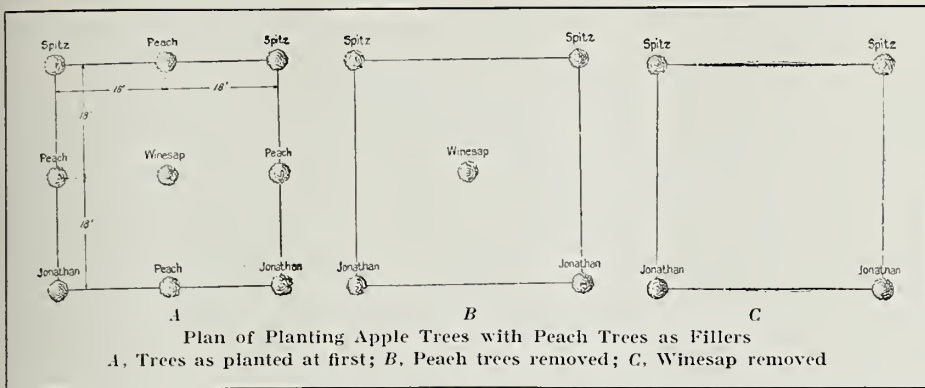
In the course of a few days the fire will have progressed so that the stump will be cut off about the top of the

earth covering and fall to one side. If proper care has been given during the first few days of burning, covering the fire as it progressed into the stump, there will be but a small portion remaining to be covered. This should be completed as soon as possible after the stump has burned entirely off. From that time on the care consists of regular visits of the operator. As before stated, there are two distinct methods which may be adopted: that of rather heavy covering, which is much slower but preserves the charcoal, and that of rapid burning, promoted by a light covering, consuming the charcoal as fast as possible. In the slow burning the soil is heated less and is left in a better condition for agricultural uses. In a few days more the crown of the stump should be entirely burned out. A little experience soon enables the operator to judge of the progress of the burning by the appearance. The covering will settle down so there will be quite noticeable depressions with smoke issuing from them. The cold air from the outside finds its way into the lower places, bringing the full store of oxygen and the fire burns faster, eating out still greater spaces until there is at times a considerable opening in front of each of the roots the fire is following out into the soil. Encourage and assist this burning by following up the fire with the soil. If a rapid burn is desired leave a very small air space at the top of the hole. If a slow burn is preferred and it is desired to convert the wood into charcoal, fill up the entire space with not more than three or four inches of covering over the fire. This checks the air circulating so that not more than enough oxygen reaches the fire to carbonize or char the wood.

It has been the opinion of many who have tried it that this method is not adapted to gravelly or sandy soils, but our experiments have convinced us that it may be profitably employed by modifying the method to the needs in the changed conditions of soil. We have done this successfully as follows:







Prepare the stump in the usual way, that is, removing the bark and digging away objectionable soil to about the depth one would want to plow, making a trench around the stump, wider at the top than at the bottom, the sides sloping toward the stump. Now put the fuel in this trench, using the same amount of fuel and placed in the same way as we have described above in the dry season. During the unfavorable seasons a concentrated fuel may be used with good success. Where dry sawdust is available use about one-half bushel of this in the trench, with kindling wood laid around next to the stump, then use from one to three gallons (depending on the size of the stump) of fuel oil poured over this kindling wood and sawdust. Next place a small amount of coarse wood and pieces of bark or any good fuel which may be at hand over this, and fill in with pieces of bark, chips, rotten wood or ferns around the top of the fuel to prevent the dirt falling in between the fuel and the stump at the start, cover the fire and care for the stump as before described. For unfavorable soil conditions an artificial covering is necessary. This may be of any material obtainable that is sufficiently granular in form to not settle together too tightly, making as nearly as possible a non-conductor of heat. We have successfully used ordinary coal cinders and clay hauled from the nearest supply point. The coal cinders and clay make a splendid covering except at a time of heavy precipitation. They do not have the capacity to absorb moisture that clay has, hence more water reaches the fire, although our experience with this feature of the work has been limited. However, this does not seem to make a great deal of difference, as the cooling, heat absorbing effect of the water in the clay gives about the same result. There is an advantage in the cinders for artificial covering. The supply can be taken up from the stump burned out and carried to the next stump to be burned. Perhaps in time we shall find other materials that will take the place of these where they are not convenient. We have been frequently asked whether it might not be possible to use sheet iron or other like substance for this covering. At first thought it would seem that this would be possible, but in actual practice it fails, first because

such materials are conductors of heat and conduct the heat away from the stump, and, second, they are rigid and do not follow the fire closely. Any cover that is rigid might be successful for a time, but when the material has burned away some distance the radiating effect is lost, and since radiated heat diminishes as the square of the distance increases the loss is apparent.

We do not think it advisable to use large pieces of bark for fuel, but if the bark is broken up pretty well it serves the purpose of fuel when placed on the outside of the fire. Bark is a natural non-conductor provided by nature with many air cells to protect the growing trees from the extremes of heat of summer and the cold of winter, but when broken up into small pieces and placed around the top it will take the place of fuel, although it is not as good as dry, sound wood, except to fill the smaller spaces between the other fuel. From our observation where clay, which has been shoveled over a few times before being placed over the fuel, is used for artificial covering it is pretty well broken up, so that in placing it over the fuel there are not many air spaces left around the bottom to help draw the fire around the stump at the start. We have found it advantageous to so lay in a few pieces of bark or other material that there will be openings left around near the ground line to admit the air. Fuel oils may be had very cheaply wherever they are used for fuel in factories, steamboats or railroad engines, costing about three dollars when bought by the barrel but as little as ninety cents per barrel in quantities. One barrel of oil used as we have suggested is sufficient for from twenty to thirty average stumps,

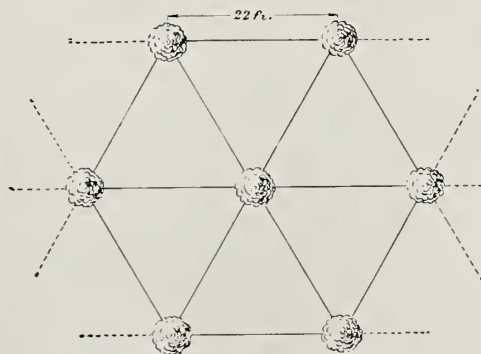


Figure 6—Hexagonal Method of Setting Out Orchard Trees

and where one can use his time to advantage this is about as cheap a fuel as one could get by any method of preparing fuel. There is a further advantage in the fact that oil is a concentrated fuel and permits the maximum heat production in the minimum space.

The following data as to the cost of removing stumps from burned-over land was obtained during the fall of 1910. Three distinct methods of firing the stumps have been observed, and cost data for each method was secured. The plan most generally used is that known as the "Yount Method," since Mr. Harry Yount of Woodland, Washington, was one of the first farmers who made use of this method of destroying stumps. His method consists essentially in starting a fire entirely around the base of the stump, under a covering of earth and sod, which confines all of the heat of the fire to the stump and causes it to "char" or become destroyed by the same general process as is utilized in charcoal pits. Mr. Yount has been using this method for several years, and in order to furnish exact data on the cost he commenced August 30, 1910, to fire twenty-four stumps, performing all the labor necessary to complete burning out of these stumps in thirty-six hours, which, at twenty-five cents per hour, gave a total cost of thirty-two and one-half cents per stump. These stumps were of an average size, forty inches at the cut-off, varying from twenty-four inches for the smallest up to seventy-two inches for the largest. About the first of September 100 stumps were fired on the farm of Henry Dupurtis of Andra, Washington, the average diameters of which were thirty-two inches at the cut-off and forty-six inches at the bottom. The work of firing the 100 stumps was completed in four days and four hours. The after care consisted of one hour each morning and evening for three weeks, making a total of 130 hours, at twenty-five cents per hour equals \$33.33. Ninety-seven of these 100 stumps were burned out successfully, which gave an average cost of thirty-four and three-tenths each. J. W. McCutcheon of Adna burned out 130 stumps from an old field in thirty days. Mr. McCutcheon paid \$2 a day for labor, making \$60 for the 130 stumps, or forty-six cents each. Mr. David Fay of Adna removed 39 stumps from an old field in eight days' time for firing and three hours a day for five weeks in after care. He valued his time at \$2 per day, making a total of \$37, or ninety-five cents per stump. These stumps were much above the average size, all the smaller ones in the field having been removed by other methods.

Another successful plan for applying the same principles with a slight change of method is that employed by Mr. W. H. Booth of Sopena, Washington. In 1908, with the help of his two boys, he removed 603 stumps from sixteen acres in nine weeks, and in 1909



he destroyed 350 stumps from twelve acres. In 1910 225 stumps from eight acres were destroyed, not keeping any record of the time for the last two years. Counting nine weeks' time at \$36 per week for the three laborers would give \$324 as a total cost of removing 603 stumps in 1908, an average of a little less than fifty-four cents per stump. These stumps were removed from old fields where all small stumps had been previously taken out. The average size of these stumps was fully up to anything that was found in the state, being very large. Mr. Booth's method is to fire the stump at but one place. He first prepared good fuel from good wood by cutting it up during the winter season in convenient sizes to handle. This is piled up to dry and the firing is not undertaken until the driest part of the summer months. He then selects some part of the stump where two large roots are coming out near together from the stump and digs away the earth from fifteen to eighteen inches deep, or until he gets a little below the point where the two roots fork. He then goes on the ground and builds a good fire in each of the previously excavated holes and leaves it burn several hours uncovered, then if there is a good bed of hot coals and the stump begins to show indications of taking the fire he replenishes the fire with a little fuel and covers over with earth about the same as previously described. The after care consists of keeping the stump banked up ahead of the fire all the way round. Mr. Booth thinks that on large stumps it would probably pay to fire them from two opposite sides, as that would very much hasten the operation. This method of burning by firing from one place is necessarily slow for each stump, but where there is plenty of work ahead in firing other stumps the time required for a stump is not so much a factor.

The most favorable data that we secured is that furnished by Mr. A. W. McCormick of Woodland, Washington. Mr. McCormick had an old field with a large number of stumps which he contracted to have burned out by Mr. George Lanham at fifty cents a stump. Mr. Lanham commenced work August 12, 1910, keeping, at our request, accurate account of his time. He successfully burned out 219 stumps in 198 hours. This is the most favorable record we have obtained, and we believe that the burning was done under the most favorable conditions that we have yet seen. The time, August and September, was when everything was very dry, there having been no rain to speak of for more than two months. The natural slope of the hill was very much in favor of cheap destruction in that there was a very good slope to the west and toward the prevailing winds at that place. This field had been plowed for many years in the same way, throwing the furrows down hill, thus banking

up the upper side of each stump and removing much of the earth on the lower side. Mr. Lanham, with his axe and mattock, would pull down some of the half-rotten wood from around the top of the stump, build a little fire under the exposed part of the roots, cover over with soil and go on. The stumps being pretty well banked up, as described, there was little more to do than to visit the fires regularly and keep them covered as the burning progressed. It should be said, however, that of the 240 he fired twenty-one failed to catch by the first firing, leaving 219 successfully burned out. The work here reported and all the figures given were obtained under most favorable climatic conditions and in a soil naturally adapted for this method of burning.

We have no reliable data at hand as to the cost where artificial covering for the fires has to be hauled to the ground, but think from experience that where material for covering may be had so that the operator can haul in three or four loads of clay or cinders

a day the average stumps, say of forty inches diameter, can be burned out under average conditions for somewhere between fifty cents and a dollar each, which is much less than the expense of removal by any other known method. From our observations we believe that it will pay those desiring to clear land by this method to so plan the work as to take advantage of favorable seasons and conditions, and that the method will not be so successful in the heavy clay soils during the extreme wet seasons as it will be during a more favorable season, since there will not be so much success in burning out the roots because of the water holding capacity of the heavy clay and consequent wetter condition of the roots. On the other hand, we believe that in sandy, gravelly, loam soils, the burning will be just about as successful during the wet season as at any other time because of the fact that such soils are naturally well drained and the soil saturation is not so great as with the heavy clay soils.

## Expert Tells How to Prune Trees

R. E. Trumble in Wenatchee (Washington) Republic

**P**RUNING can be considered from two viewpoints. First, from the well being of the tree, and, second, from the artistic viewpoint. Under the latter point comes the matter of high or low headed trees, round or tall shape, and other matters of personal preference. These things are not vital to the well being of the trees. A thorough exposition of pruning has never been written. This is due in part to the fact that in pruning each tree is a new problem and cannot be treated like any other tree. It follows, then, that the only way to learn to prune correctly is to learn the underlying principles.

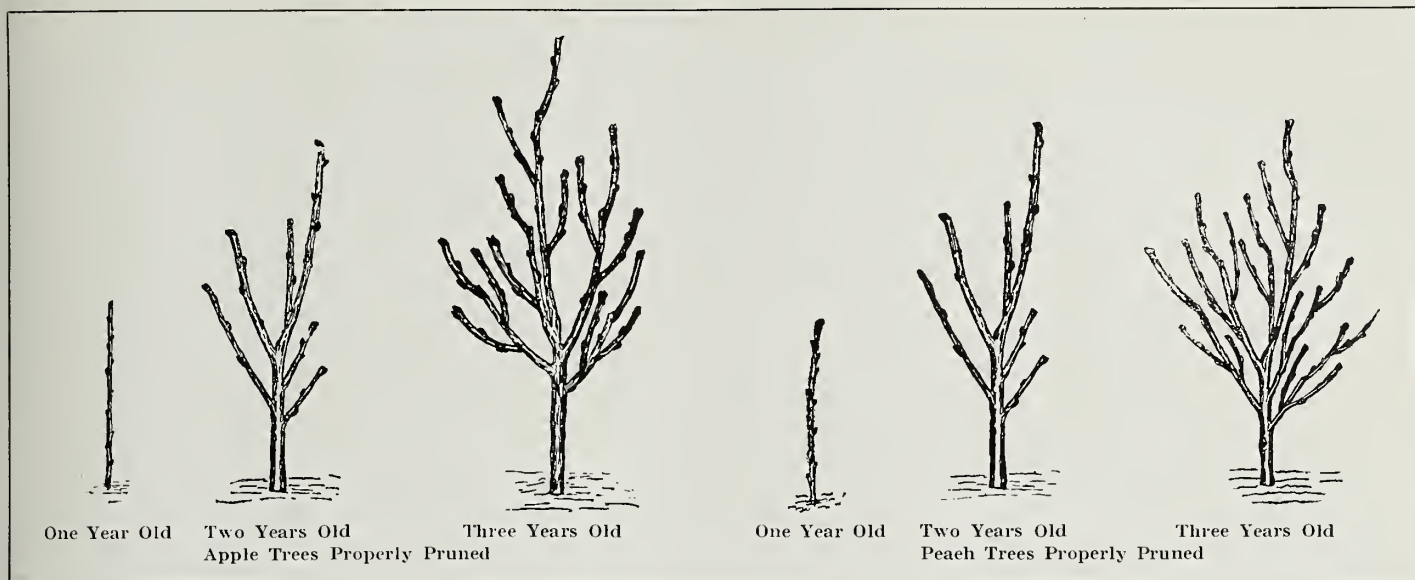
In the same way that no trees are alike, no two branches are alike, yet all have some traits in common. One of these is the fact that all branches grow from the terminal, and that the buds farther along the branch are stronger than those near the crotch. This is because the buds near the end are able to secure more sunlight than the others. Every bud on a tree if permitted to grow would develop into a branch. This we know never happens, so it follows that the tree develops some buds at the expense of others. There is a struggle for existence between the buds and twigs, and the great majority of buds never develop. This is natural pruning.

The question has been raised and agitated by prominent authorities as to whether pruning devitalizes the trees. This can be considered from three viewpoints. First, from the principles of growth, we know that a tree is a group of smaller trees. Unlike animals, the branches are not organs performing specialized functions; but each branch does the same thing the other branches do, so that

cutting one will only help the remaining ones. You are merely following the practices of nature. Some plant physiologists have raised the theory of initial vitality and that pruning lessens this vitality, i. e., an unpruned tree will have a vitality of ten, and after part of the tree is removed the vitality will be nine. The error in this theory is in the hypothesis. The vitality of a tree depends on the nourishment and outside conditions. Cutting off part of a tree does not rob it of vitality, but, on the other hand, the shock tends to increase the energy of the other parts. The exception to this rule comes in the case where too many leaves are cut off. The third circumstance in support of pruning is common experience. It has been proved again and again that more and better fruit can be grown on pruned than on unpruned trees.

In studying the principles of pruning, we must study and watch the fruit spurs and buds of the different trees. These vary greatly. Peaches bear on last year's wood, apples on year before last's. Peaches grow from lateral buds, apples from the terminal buds. Peach buds come in triplets, a fruit bud on each side of a leaf bud. In apples the fruit buds are separate; they are identified by their shape and size, being larger and more blunt than the leaf buds. In the East a fruit bud bears every other year, but in the West they bear every year. Differentiation into fruit and leaf buds takes place in the summer, so that only summer pruning can effect them. Summer pruning will cause an increase in the number of fruit buds. A very important detail, and one that is generally overlooked by the pruner, is the method of making cuts. Cut





smoothly, close to branch. If you cut otherwise stubs projecting will be slow to heal, and will probably become infected, in time rotting the entire heart of the tree. This is a point often spoken of but rarely observed. That it is important is shown by the fact that several species of bacteria live entirely on the cuts and exposed wood of trees.

All healing is done by the cambium layer. The aim of the grower, then, is to keep the cambium active, especially around the big cuts. This can be done by irritating the callous formed with a knife or, better still, by slitting it. The pressure of the cambium on the bark has been demonstrated at fifty pounds to the square inch, so that a cut will cause a rapid growth. No dressing has been devised that will cause a wound to heal rapidly, the function of a dressing being only to cover the wound and to prevent infection. Lead paint is most satisfactory. Cornell University has held a series of experiments to determine the time to prune, and has proved that successful pruning can be done at any month in the year. The wounds heal far best, however, if pruned just before the growing season. In the sawing of large branches it is best to make a first cut about a foot from the trunk and then saw the stub off at the trunk. In this way you prevent the weight of the branch tearing the cut when part way through. Altogether too much pruning is done by growers and professional pruners from a viewpoint of form and appearance. This is all right for shade trees, but fruit trees have a different purpose, and must be pruned with a view to fruitfulness and well being. Since no two trees are alike, and since conditions vary, it follows that no specific rules can be given for pruning each and every tree; but, as before mentioned, there are principles of pruning that apply to all trees.

Top pruning produces wood growth. The reason for this lies in the fact that the top and roots of a tree balance each other, i. e., the top is just

large enough to handle and transform the sap sent it by the roots. If this balance is disturbed by the loss of part of the top, the tree at once restores it. Root pruning lessens the production of wood. Checking growth tends to develop fruit spurs. This is true if done at the right season and if done in such a manner as to give an excess of food. Nature has provided that all living things, when destruction threatens them, will hasten to reproduce. Therefore, checking the growth by ringing, or summer pruning, will cause increase in the number of fruit buds. Heavy top pruning in the winter will rejuvenate sickly trees and stimulate slow growing ones. Trees injured by frost can often be saved by pruning severely just before the growing season, the excess of food overcoming the injury by frost. The season of pruning affects the habits of the tree. Summer pruning will cause fruitfulness because of the excess of food and the check to the growth; winter pruning will cause a woody growth because the balance of the tree is disturbed. Pruned plants tend to resume normal habits of growth, i. e., the effects of pruning are temporary and must be repeated.

Habits vary from youth to age both as to bearing and growing. Young trees grow erect and rapidly; later they broaden and give more strength to fruit bearing. Fruit bearing is a habit and may be changed some when young. Once the tree is bearing properly keep it bearing constantly, and never let up for a year, as it will be hard to start when older. Growth is from the terminal buds; put each terminal bud in the direction you wish the branch to go. Heading in young trees will broaden and thicken the top; this process can be used for branching drooping trees. An obstruction just above a limb tends to develop longitudinal growth; the reason is that food returning from the top of the tree is stopped and that food coming from the roots is directed up the branch. An obstruction just below a

limb tends toward quiescent growth because the food from the roots is cut off.

One part of a tree can live at the expense of another. Water growths and suckers develop too rapidly to manufacture all their food. The cold countries are apt to have excessive evaporation, therefore one wants few branches and leaves. Warm climates have sunscald, and there lots of foliage is needed. These rules, as can be seen, are general in their nature. Anything more specific would be apt to be misleading because of the great variation of conditions. They must be taken by the grower and applied to his own specific orchard, and to each tree in that orchard. Each grower should prune his own trees; first, because he is most interested in them; second, because he knows what the trees are doing and what they want, and, third, because he knows what he wants.

#### COMPETING FOR PRESIDENT ELLIOTT'S \$500 APPLE PRIZE

Nineteen apple growers of the Northwest have entered the prize contest at the American Land and Irrigation Exposition which will be held at Madison Square Garden, New York City, November 3-12. President Elliott of the Northern Pacific has offered \$500 in gold for the best display of twenty-five boxes of apples, any variety. Those entering the contest are: Beasley & Dinges, North Yakima; John H. Estes, Toppenish; H. M. Gilbert, North Yakima; Robert Johnson, North Yakima; Elmer B. Johnson, Prosser; Ulrich C. Johnson, Toppenish; J. D. Laughlin, Toppenish; Harry Maxted, owner, and Frank L. Howling, manager, North Yakima; C. H. Pearl, Prosser; Ella D. Rowland, Toppenish; C. C. Greageson, Prosser; Yakima-Euclid Fruit Company, Prosser; Ernest C. Hill, Selah; John Seoon, Sunnyside; Olson Fruit Company, Toppenish; C. Tiehaeck, Moses Lake, and Laughlin McLean, Spokane, Washington; H. A. Brigg, Victor, and S. W. A. Wilson, Paradise, Montana. The outcome of this competition will be watched with deep interest by the people of the Northwest, and may the best man win.

The King of the Woods drag saw machine got the blue ribbon, highest award, at the Oregon State Fair at Salem this fall. This is a wonderful wood harvester, and with the new improvement the operator without changing his position can lift the saw out of the cut and at the same time operate the lever to pull the drag saw ahead. A very handy arrangement for sawing small logs. It will pay you to look into the merits of this machine. Write the manufacturers, the Reiersen Machinery Company, Portland, Oregon, for their special offer.\*



## Gardena Orchard Experience of E. C. Burlingame

From Freewater (Oregon) Times, January 21, 1910

THE object of this article is of vast importance to the thousands of prospective fruit growers and home builders in the Pacific Northwest; and in talking to you on the subject of planting and care of young orchards I shall not undertake to do so from a scientific standpoint, for the simple reason that I am not a scientific man. I shall talk to you as a fruit grower young in the business, and give you the benefit of my experience and observation along this line.

If a fruit grower gets the right start in putting out his trees, uses common sense and applies himself seriously to the making of a successful orchard he is bound to succeed; and in succeeding he is giving to society as well as to himself an object lesson. In selecting a tract of land for home or an orchard plenty of time should be taken to examine soil and climatic conditions, water supply, transportation facilities and everything that pertains to the same. It is important to consider this truth: The better the general soil condition the better and greater the product and income of your farm is ultimately bound to be.

It is an assured fact that if from seventy-five to ninety per cent of the upper ten feet of your orchard tract is gravel or coarse sand, rock and boulders it will not begin to give you the revenue that a tract would where these objectionable features do not exist, as growth, color, size and appearance of your fruit to a great extent is going to correspond with the condition of your top soil and sub-soil. A reasonable amount of sand or gravel in the sub-soil is not an injury to an orchard, as it gives it natural drainage regardless of the slope of the land. Inasmuch as seventy-five per cent of the orchard tracts in the Pacific Northwest are going to be irrigated land the question of drainage is always a serious one; but where irrigation is conducted with intelligence—which is being done more every year—it becomes a matter of judgment in applying the water to the land rather than drainage. If a farm does not lie naturally so that the water drains off well the intelligent fruit growers, realizing that a water-logged condition of the soil is injurious to his fruit, will quickly learn to apply only the amount of water needed for the growth of the crop and not allow a surplus water to be turned on, thus, through his intelligence, reaping the greatest returns from his orchard.

The poorer the soil and the more boulders and rocks it contains the greater the amount of artificial fertilization required; and it is only a question of a few years when the now easily obtainable fertilizers, such as barnyard manure, will be in such great demand as to be come costly, and artificial fertilizers will have to

be shipped in at great expense, as is now being done in the orange orchards of Southern California.

In planting an orchard great care should be taken not to get the trees too close together. Figuring all the time ten or twelve years ahead, the orchard grower should picture to himself the size of the tree when it will be ten to twelve years old and plant accordingly. One of the chief causes of so many small size, inferior looking apples is that the trees have been planted too close together. Hardly two fruit growers agree on just how far apart the trees should be, but the progressive fruit grower of today is giving his trees plenty of sunshine and room for thorough cultivation with teams between trees. Orchards that I have been planting the past year or two are planted on the hexagonal plan, thirty feet apart with fillers, equaling the number of the original trees, leaving my orchard rows twenty-six feet apart and the trees fifteen feet apart in the row. I am using an early quick bearing fruit tree for fillers, thereby enabling me to secure an early return from the orchard. The Rome Beauty or the Jonathan make excellent fillers, commencing to bear the third year and at five years yielding about two boxes to the tree. Filler trees should be allowed to bear as long as possible without injury to permanent orchard, and should then be taken out. Some orchardists argue that one of the drawbacks to the filler tree is that the planter will not cut the filler out on account of the money he is receiving from it. That might have been the method pursued by orchardists in former days, but I believe the intelligent fruit grower of today will not hesitate to remove the trees that he knows are a menace to the future welfare of his orchard.

In digging the holes for the trees I make it a rule to dig as large, deep hole, say two feet to two and one-half feet in diameter, and not less than two feet deep, in good soil; and where hardpan exists, as it does in some localities in this country, if from six to sixteen inches thick I invariably go entirely through the hardpan, even though I dig the hole four and one-half feet deep. In removing the soil from the hole I always place the top foot of soil in a pile to one side by itself, placing the soil below that in another pile by itself, and after the hole is dug I refill it to within eighteen inches of the top with the best top soil in the vicinity, leaving the soil taken from a foot below the surface to be scattered on the top of the adjacent land. This gives the young tree the benefit of all the strength of the humus in the topsoil and gives it a fine bed to start its young roots in, and in the case of the hardpan gives opportunity for the

roots to go down and leaves a drainage through the hardpan for any surplus water that might naturally accumulate there.

As the Pacific Northwest is a country of prevailing winds, I lean my trees sharply in the direction of the winds. In setting the trees out where I have water I always run the water in a furrow down alongside the proposed tree row, allowing the holes that I have already partially filled with the top soil to fill with water, thereby settling the ground compactly and firmly below the roots of the trees that are to go into the holes. I set the tree on top of this foundation of top soil, already settled and wet by the water, and spreading out the roots with my hands tramp them firmly and fill within an inch of the ground level, completely and firmly, with the best top soil in the orchard and again run the water down the tree row, letting it into the tree hole, thus settling the new top soil around and over the tiny roots and fibers of the tree; and after a couple of hours I follow along with a shovel, completely filling the hole with dry, mellow surface dirt, thereby preventing any crust forming around the tree. Healthy trees thus planted will give ninety-nine per cent of a stand. I cut my trees off about sixteen inches above the surface of the soil.

In this country the hard fight will be to get the trees evenly balanced or shaped—I mean the side away from the prevailing wind is apt to be the heavier and the limb growth on that side much the better, as the trees lean the way the wind blows, and those limbs have no hindrance to their growth; whereas the limbs on the windy side of the tree from the time they make their appearance as tiny sprouts until the end of the season are blown and twisted around in all directions by the wind. It is one of the problems of the orchardist to get as many limbs on the windy side of the tree as on the other. I advocate grafting new limbs or buds into the young trees where the wind has kept them from growing, and shall continue to do so with my own every year until such time as my orchard is big enough to partially protect itself and until I get the trees uniform in shape, that is, for the limbs on the windy side of the tree to balance in size and length the limbs on the opposite side of the tree. This is absolutely necessary to produce a beautiful, shapely and symmetrical tree, bearing fruit equally on all sides. If an orchardist persists in this method a few years he is bound to have what he wants—a perfect shaped orchard tree.

I cut back the first year's growth of the young trees to about six inches, the second year's growth to about eight inches, leaving the third year not to exceed one foot, estimating that it will take three years to form the main tree and its permanent limbs. In our windy country a low, droop-



ing, broad spread tree is the ideal for the commercial orchard.

The application of water to an orchard depends entirely upon the location of the orchard and the nature of the soil therein. If the orchard is situated on a side hill and the ground is inclined to be gravelly and porous it will necessarily have to be irrigated oftener than on heavy, fine grained soil. In my young orchard in the Yakima Valley I was compelled to irrigate, cultivating thoroughly after each irrigation. In the Walla Walla Valley, with its light volcanic ash soil, in my young orchard, I only irrigated once during the season, but I cultivated the orchard several times with a spring-tooth harrow early in the spring before irrigating. Immediately after irrigating I continued cultivating and working the top soil thoroughly, so as to conserve all moisture therein and prevent the ground from caking or forming into clods later on. After irrigating an orchard it should always be cultivated very thoroughly as soon as it is safe for horses to go upon the ground without miring.

In my opinion cultivation is the one thing which so many orchardists fail to appreciate. When an orchard is free from weeds and is dry and mellow on top, the general impression is that this is all that is needed to keep it in proper shape. This is entirely wrong. What has been done is good so far as it goes, but the good work is only commenced. Constant and thorough cultivation is the one important thing in orchard culture. If an orchard is cultivated every week or ten days many people think it a waste of labor and time, because the soil looks just as it did before, but if you will get right down to nature and take a piece of land and cultivate it once a month and take another piece directly adjoining it and cultivate it once a week, the end of the season will tell you plainly that the orchard cultivated once a week will have a greater amount of conserved moisture in the soil and a healthier growth of the trees.

My young orchard of 140 acres at Gardena, Washington, where the natural rainfall does not exceed seven inches per annum and oftentimes is only five, I thoroughly irrigated once in the spring and immediately afterward cultivated the ground, plowed it deep and commenced the summer's work of cultivation. It took a four horse orchard cultivator exactly eight days to go over the orchard, and my man never ceased cultivating from the time he started in April until the end of October. As fast as he went over the orchard he immediately turned around and recultivated it, keeping this up the entire summer, gauging the cultivator a little deeper at each cultivation until at the end of October it was being cultivated about ten inches deep; and you could see at that time that the cultivator teeth still continued to bring up moist ground. It was in

reality a practical demonstration of what cultivation will do. I did not myself expect to conserve the moisture as was done. I fully expected to have to irrigate the orchard in August, and I went weekly to examine the soil, but I saw, with agreeable surprise, that the moisture continued in the soil. Knowing that it would be much better for the trees to go into winter with a tough, matured wood growth rather than a fresh burst of new growth, I refrained from irrigating them. The result was that I had on young trees planted this spring from two to three and one-half feet of wood growth, and on trees planted a year before from two and one-half to five feet wood growth. Talking with fruit growers this fall after they had looked at my orchard, several of them remarked: "Why, your orchard has made too much wood growth this year." To my mind cultivation is three-quarters of the battle. By constant cultivation every weed is killed, no insects are allowed to grow or live in the soil and almost the entire amount of moisture put in it is conserved. The dust blanket formed by constant cultivation makes a splendid non-conductor, and while the soil may not

have lungs to breathe with, one watching the growth of trees would almost think they got their inspiration from the lungs of the earth.

I believe that anybody writing an article on the growth of orchards, or on any other subject about which he presumes to know something, should actually practice what he preaches; and a visit to my orchard would tell you that I am doing so. If a man were to get one dollar each for the growing weeds found in my orchards I seriously doubt if he could, with his money, pay his board at country rates for the time spent in the search. I take it for granted that you would not expect me, a farmer, to write as well as I work, but I fully believe that if the fruit growers of the Pacific Northwest will constantly cultivate their young orchards during the growing season they will become imbued with the idea that if constant cultivation makes a successful growth for a young orchard, constant care and constant application of the best methods after the trees are grown will without doubt make successful orchardists—in my mind, the best class of people in the world.

## June Budding of Cherries

By W. H. Addis, Montavilla, Oregon

**J**UNE budding is not practiced in this climate and is not considered practical. Many consider it impossible. Cherry budding is more difficult than any other kind of fruit tree budding. The accompanying photograph shows buds inserted at three different times. The larger limb from the upper joint is the result of a bud inserted in Sep-

tember, 1910. The bunch of leaves standing out in front is a bud of this year's growth, inserted in June of this year. The string on the limb to the left marks a September bud of this year, while the limb to right and the one seen dimly behind it are grown from dormant buds taken from graft sticks, inserted in June of this year. The one that can be seen least of any is from a terminal that I split and inserted as I would a bud. It will be seen that the buds of this year's growth lived and made leaves, but did not grow a branch. On the other hand, the dormant buds of last year's growth made a splendid limb growth, almost as much as was made by grafts set in March, and a much smoother, better joint.

Keeping the buds dormant is the most important point. The best way to do this is to cut your sticks in January and put them in a cool place with their buds to the ground. Never pile the dirt around them nor allow them to become too warm. Too much moisture or too high a temperature will cause them to start growing and to soften up. The buds should be as dormant as when cut if possible, but not too dry. If the stick has not withered so much the better. Top working Mazzard seedlings is very difficult, but I have found that it can be done more successfully and satisfactorily by budding in June with dormant buds than by any other method. June budding can be done on trees where the grafts have failed to grow. This gives us two tries at the same tree the same year.



Illustration Showing Buds Inserted at Three Different Times



## Art of Careful Pruning a Very Helpful Practice

By C. I. Lewis, Professor Horticulture, Oregon Agricultural College

**M**ANY people seem to think that pruning is a weakening, a devitalizing practice, and it may be such, but only under very unusual circumstances. Nature is a vigorous pruner—probably not more than one bud in ten survives in the race. Notice the forest trees, how the lower branches die; or even in our orchards how many of the branches succumb in the battle of life. Pruning, when properly done, instead of devitalizing should give more life, more vigor to the plant.

The first lesson for us to learn is that there is a natural balance between the root and the top. Disturb gently this balance and you give rise to serious reactions. Deep plowing of an orchard which has not been plowed for years cuts off many of the feeding roots. Unless the top is pruned back we find that the tree makes a feeble growth, the leaves being often less than half their normal size, the fruit small and often worthless. On the other hand, should you prune the top very severely on trees of good vitality, the reaction will be a thick growth of watersprouts, which will sap the vitality from the other parts of the tree. Only by laborious summer pruning and everlasting vigilance for several years can the tree be restored to its normal condition. There are certain cases where heavy pruning is advisable. Often old peach trees have lost all the vigorous wood, especially that which is found on the inside and lower sections of the tree. Such trees have outlived their usefulness, but often have the vitality sufficient to grow a new top when they are very severely cut back to stubs. Likewise, old cherry trees which have in some cases ten or twelve feet of dead wood in the top can be built into strong, vigorous, heavy producing trees by cutting back severely to vigorous wood. In such cases we are confining the whole energy of the trees to a much reduced number of buds. Badly frozen trees are subjected to the same treatment.

Young trees will stand much more severe pruning than old ones. The reaction can be handled much more easily by a combination of summer and winter pruning. The problems of pruning, then, differ with the age of the tree. We find the habits of the young tree to be different from those of the old one. In the young tree the terminal buds are the dormant ones, while in the old tree the lateral buds become the stronger. A pruned tree always tends to return to its natural habit of growth. Cut the center from a tree and you will note that it strives to develop a new one. Head in a strong grower, and it tends to shoot upward again. I would not have the reader think that we cannot modify by pruning, for it is well known that the heading in of young trees develops a stronger lateral growth. This head-

ing in, if not too severe, in some cases serves as a check to the tree and serves to induce fruitfulness by causing the formation of fruit spurs.

The season has an influence on pruning. Winter pruning, if it is done heavily, tends to produce wood. Summer pruning, if lightly done, probably aids in the formation of fruit buds. A combination of the two will probably give the best success. As an example, the thinning out of surplus wood in winter and the light heading in during the summer. Such phases will be discussed more in detail in the future. In conclusion I would state that the habit and individuality of the tree

must be studied if one prunes intelligently. Some trees are naturally very fruitful, others are not; and often in such cases pruning seems to be of little value.

### Editor Better Fruit:

Please accept my thanks for the additional copy of the September issue which I have received from you. I also have your letter of the twenty-seventh and am pleased to say that you have good cause to be proud of not only your July number but of every month's issue that I have seen. Yours respectfully, Joseph Flaherty, Pittsburg.

### Editor Better Fruit:

We find that your paper is a very valuable one to the fruit grower, and we get a great many inquiries on account of our advertisement in your paper. We advise all of our people to subscribe for your paper, as we find that the articles which you publish are of such high order that they are valuable to every person who is interested in this subject. With best wishes for your success in maintaining this high standard, we beg to remain yours truly, Spokane Valley Irrigated Land Co., Inc., by D. M. Thompson, President.



There has been considerable discussion about the life of an apple tree. The above illustration is a picture of an apple tree planted at Vancouver, Washington, in 1821. It must be borne in mind that this tree has stood for eighty-six years without cultivation, without care and neglected in every way. It is still bearing fruit at eighty-six years old, showing the life of an apple tree in the Northwest. Some people are under the impression that apple trees in the Northwest do not live as long as in the East. Elsewhere in this edition we give an illustration of the "Handy Apple Tree," grown in Virginia, claimed to be one hundred years old, also an illustration of an old apple tree grown in North Carolina, claimed to be one hundred years old or more.





## Largest Apple Tree in the Country

WE are indebted to the Southern Railway Company of Washington, District of Columbia, for the accompanying illustration of the remarkable apple tree grown in Wilkes County, North Carolina. Apparently the climatic conditions of that section are particularly adapted to apple raising and peculiarly conducive to great longevity of apple trees. This tree is known to be over one hundred years old, and may be one hundred and fifty. It certainly must have been a large tree ninety years ago, for Mr. Newton Gentry of Trap Hill, Wilkes County, North Carolina, states that his grandfather, Jim Fields, killed a deer in 1820 near this tree, and hung it on a limb to put it out of reach of dogs and wolves while he continued his hunt. Mr. Gentry has used the fruit from this tree for over sixty years, and Mr. W. A. Johnson, his neighbor, states that the tree was as large fifty years ago as it is today.

A recent measurement showed the trunk to be sixteen feet five inches in circumference at the ground and twelve feet six inches just below the first limb. It is also stated that the trunk is perfectly solid to this day. Were it cut down and the center hollowed out it would be large enough for an ordinary cow to walk through without touching her sides or back to

the inside walls. The tree has been neglected for years, but was recently pruned. Before the large limbs were cut off the spread was about sixty-two feet.

The variety is not exactly known, but the natives call it the "Rich Apple," as the color is a rich yellow and striped red, and has a very fine flavor. The fruit is ripe about September and keeps until late fall. Mr. Gentry does not recall a year in the past sixty that it has not blossomed, and thinks he has seen at least fifty bushels of apples grown on it in a single season. The tree is now owned by J. B. Horton of Elkins, North Carolina, and the apple will be cultivated and perpetuated under the name of "Horton's Second Century Rich Apple." This name has been suggested as the tree is now in its second century, and bids fair to live a great many years longer.

### Editor Better Fruit:

We have yours of the sixth stating you were going to send an extra copy of your paper each month that it may be taken home. We certainly appreciate this very much, for it always contains valuable articles and suggestions, and the writer has been religiously keeping all the marked copies you have been sending for the last two years. Keep the good work up, for you have surely set a pace that is hard to follow and one that is well worthy of emulation. With best wishes for your continued success, we are yours very truly, Yakima Valley Nurseries Company, B. R. Sturm, Manager, Toppenish, Washington.

### NEW SPRAYING RECOMMENDATIONS OF VALUE

We have never yet found a man too old or too experienced to learn. In fact, the more we learn the more we realize how little we do know. No fruit grower, however experienced, can afford to pass by without considering the experience of other successful growers. Therefore every fruit grower should obtain a copy of the new book, "Spraying Simplified," just published by the Vreeland Chemical Company. There are two points in this book of especial interest to the experienced grower, the section on fall spraying and the recommendations for the extensive use of lime-sulphur solution as a fungicide. A few growers, no doubt, will take issue with some of these spraying directions, but as the book was compiled from the recommendations of the highest authorities and from the experience of practical growers who have used and thoroughly tested out the spraying suggestions recommended, they are entitled to respectful consideration. The recommendations are new—not a rehash of old matter which has been proved obsolete in the light of our later and more complete knowledge of the orchard's enemies. "Spraying Simplified" is one of the most comprehensive yet concise booklets ever issued on this subject. While written to meet the needs of the average farmer who does not make a business of fruit raising, there is much in its sixty-eight pages that will interest every raiser of fruit. A free copy will be sent to any grower who will mention this paper in writing to The Vreeland Chemical Company, 50 Church street, New York City. \*

### Editor Better Fruit:

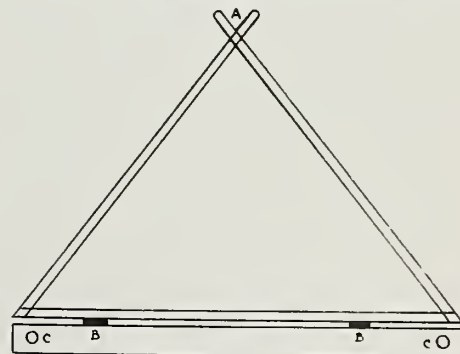
I am enclosing \$1.50 for a yearly subscription to "Better Fruit," beginning with the number for November, 1911. I am a student in horticulture, returning home to Bombay, British India, after a stay of over five years in the United States. I shall see what I can do, in my humble way, in introducing "modern scientific methods" in that ancient land of wonders. With every good wish in your work, I am, for mutual benefit and success, yours truly, B. L. Joshi.

P. S.—Sorry I have not time to visit Hood River before leaving.

J. A. Kiggins & Sons, Springwater, Oregon, cut twenty-four cords of wood in four and a half hours, and seventeen cords out of a dead log in three hours. The dead log no doubt would have been burnt up in order to clear the land but for the King of the Woods drag saw. The log will easily net the owner \$34 or more. Write the manufacturers, the Referson Machinery Company, Portland, Oregon, for their special offer on the King of the Woods drag saw.\*

### Editor Better Fruit:

The drawing herewith is a convenience I use in tree planting which I think is somewhat handier than anything I have seen for the purpose up to this time. It can be made of any light material that is handy, and should be made large enough to overcome any unevenness of ground surface. A good stiff plank should be used for the base, to which the triangle is attached with ordinary hinges at points marked "B." The points marked "C" are holes through base board through which wooden stakes may be driven into the ground to hold the whole contrivance in place. In



using, place the crotch of the triangle (marked "A") against the stake which marks position in which tree is to be planted, then drive stakes through base as before stated; now fold the triangle back and proceed to dig your hole; this done, bring your triangle back into its first position and place tree in hole with its trunk through the crotch in same position that the stake occupied. The advantage I claim for this device over others in use is that one man can handle it and always get the position of tree right, as the base is not lifted from the ground after being staked down until the job is finished. Respectfully, J. I. Benton, Millville, Washington.



# BETTER FRUIT

HOOD RIVER, OREGON

OFFICIAL ORGAN OF  
THE NORTHWEST FRUIT GROWERS' ASSOCIATION

A MONTHLY ILLUSTRATED MAGAZINE  
PUBLISHED IN THE INTEREST OF MODERN  
FRUIT GROWING AND MARKETING

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REMITTANCES MADE PAYABLE TO

Better Fruit Publishing Company

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ADVERTISING RATES ON APPLICATION

Entered as second-class matter December 27,  
1906, at the Postoffice at Hood River, Oregon,  
under Act of Congress of March 3, 1879.

**The Law of Supply and Demand.**—Political economy tells us that prices are regulated by the laws of supply and demand. It is not our intention to deny this law. On the contrary, we admit it. So far so good. Invariably growers hear of this or that fruit glutting the market, which is equivalent to hollering over-production, or supply is greater than demand. What we want to show is that such conditions do not actually exist as often as claimed; secondly, when they do methods will and can be devised to overcome them. A few years ago electricity on street car service called for the prediction "horses would be worth nothing," but a good team costs more money today than then. Just an illustration to show predictions are not always true. A few years ago the prune grower got the cart before the horse by setting out very large acreages without established demand, or business principles for marketing. The story of the prune grower should be familiar to all. While it must be admitted many orchards were dug up, the prune grower with sense went after a market and today prune growers are making big profits, and the business has been on a steady increase and not enough prunes are raised to meet consumption.

At the National Apple Show at Spokane a commercial man who had been traveling through the Northwest said

fruit growers complained of the low prices, etc., and added that he had been in dozens of small towns in Eastern Oregon and Washington and could not get a peach to eat.

A few years ago when the editor first took charge of the Hood River Fruit Growers' Union the business by express was doubled the next year, and doubled again the following year. Seattle was not consuming a single carload of Hood River strawberries in a year; neither was Spokane. In less than two years each of these cities was consuming large quantities. The first year the editor was manager of the berry union the average price of strawberries was \$1.28 per crate; during the last six years the average price for the season has been somewhere between \$2.25 and \$2.50 net.

These facts illustrate the importance to the fruit business of developing local markets. A wide and thorough distributing system must and will be worked out, so that all markets, however small, will be supplied, realizing good prices. It is all nonsense to say that little towns won't pay fair prices when it is known that bananas sell at thirty cents a dozen and Florida grape fruit sells readily in the little town of Hood River, about 3,000 population, at fifteen cents each. Then, too, the supply of green fruits can be decreased to equalize the demand and create a sale at fair prices by canneries, evaporators, cider and vinegar factories. The output of the canneries, evaporators and dryers in California in 1911 amounted to \$28,000,000.

So let us be up and doing to open up new markets, increase old ones and establish a wider distribution. Let us save the waste by canneries, evaporators, cider and vinegar factories. The problems of today are to market the fruit on business principles, create a greater demand as well as a wider demand—save the by-products; and last, but not least, study the economic side of production and marketing.

The new era is fast dawning for country life—with its many conveniences of cities—graded schools, good roads, electric lights, telephones, home comforts, good fresh air, clean atmosphere, peace and plenty; what more does the unselfish one want? Country life has ceased to be one of drudgery, and it would be difficult to find any class of business where those engaged in it have bettered conditions, surrounded themselves with more comforts than farmers and fruit growers. Once upon a time the daily papers cartooned uncle hayseed with a clumsy pair of stoggy boots, overalls hanging by one gallus, and that one fastened with a nail; seventeen patches of various pieces, never forgetting the chin whiskers, the pitchfork and the old-fashioned straw hat. "God helps him who helps himself." These farmers and fruit growers have worked hard to become prosperous, and their prosperity has not only been earned but is

deserved. Robert Louis Stevenson, an author loved by all who know him through the beautiful books he has written, says: "To earn a little, to spend a little less, to save a little, to have a few friends, that is worth while." Pardon the inaccuracy of the quotation, but it illustrates a mighty good kind of a feeling toward one's fellow man, a feeling that is strong in the country, for it is a well known fact that there one seldom finds the insatiate desire to amass millions by any and all kinds of ways.

Christmas comes but once a year, and with it brings good cheer. The fruit grower's work for the year is done, winter has come and all our thoughts should now turn to getting the most out of the long, peaceful winter evenings around the family fire-side; and it can be truthfully said that no other part of the home affords more comfort, furnishes more pleasure or gives better cheer than the good, old-fashioned fireplace.

## R. M. KELLOGG COMPANY

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THOROUGHbred PEDIGREE  
STRAWBERRY PLANTS

Three Rivers, Mich., Nov. 8, 1911.

Editor Better Fruit: Your statistical number is without doubt the most valuable issue, considered from the statistical viewpoint, of anything we ever have seen, and it should become a permanent record in the hands of every fruitgrower in the country. You are to be congratulated upon having assembled together such a vast amount of important data and for presenting it in such fine form as you have done in this instance.

Yours very truly,

R. M. KELLOGG COMPANY

### Editor Better Fruit:

While every issue of your paper is brimming over with the most valuable news for everyone connected with the fruit business, and while each and every issue seems to be more complete than the last, your October number is undoubtedly of more value than any other. From time to time a few statistics have been printed here and there, but no other publication has ever taken up the subject with such thoroughness and featured it so comprehensively as you have. There is seldom a day passes but we receive inquiries for information on subjects which you have covered, and by having them all together in one publication you have made it possible for us to answer questions without going through a mass of correspondence, press clippings and files. We feel we cannot say too much in praise of this splendid issue and know we will have to keep it under lock and key in the office to prevent its being carried away by information seekers. Sincerely, National Apple Show, by Ren H. Rice, Secretary, Spokane, Washington.

### Editor Better Fruit:

I beg to say my thanks for your courtesy in inserting the cuts of Poydras Street and of our business location, and also for the publication of the letter. However, I did not think that you intended to publish the letter, otherwise I would have written it in a different shape. I wish to assure you of my appreciation of what you have done for me and trust that I may have the pleasure of reciprocating. Yours truly, George H. Appel, New Orleans.



# The Northwestern Fruit Exchange

Announces on December 1st the following maximum and minimum prices obtained for the Cashmere and Rogue River Fruit Growers' Associations, respectively, during the season of 1911. The figures shown were, in all cases, f.o.b. shipping point. They cover all sizes, from 3-tier to 5-tier inclusive. They cover all sales made, without reserve or exception:

VARIETY	EXTRA FANCY	FANCY	CHOICE
Arkansas Black.....	\$1.75 to \$1.90	\$1.60 to \$1.75	\$1.00 to \$1.35
Black Ben Davis.....	1.35	1.15 to 1.25	1.25
Black Twig .....	1.40 to 1.50	1.15 to 1.30	
Champion .....	1.50	1.35	1.00
Chicago .....	1.50	1.35	1.00
Commerce .....	1.60	1.50	1.00
Gano .....	1.25		
Grimes Golden .....	1.40 to 1.60	1.25	
Hoover Red .....	1.35 to 1.50		
Jonathan .....	1.40 to 1.75	1.15 to 1.50	.90 to 1.35
Rome Beauty .....	1.50 to 1.75	1.35 to 1.50	1.00
Spitzenberg .....	2.00, \$2.10, \$2.25	1.75 and 2.00	1.25 to 1.50
Stayman Winesap .....	1.50 to \$1.75	1.25 to 1.50	1.00 to 1.50
Winesap .....	2.00	1.75	1.25
White Winter Pearmain..	1.60		
Winter Banana .....	2.25		1.25
Yellow Newtown .....	2.10		1.15 to 1.50

The EXCHANGE adopted the above scale of prices during the month of AUGUST. It sold the bulk of the entire output of the Cashmere and Rogue River Associations before harvest, and practically the entire output of both before packing. The prices were maintained strictly throughout the season.

The EXCHANGE invites special attention to the following factors in its marketing system: 1st, Prices received; 2nd, F.o.b. sales; 3rd, Quick cash returns; 4th, Wide distribution; 5th, Its extensive sales organization: **101 branch offices** distributed throughout the United States, Canada and foreign countries.

The EXCHANGE invites every fruit grower in the NORTHWEST to inspect its records for verification of all statements made.

## Northwestern Fruit Exchange

418-423 Spalding Building, PORTLAND, OREGON

Reginald H. Parsons, President

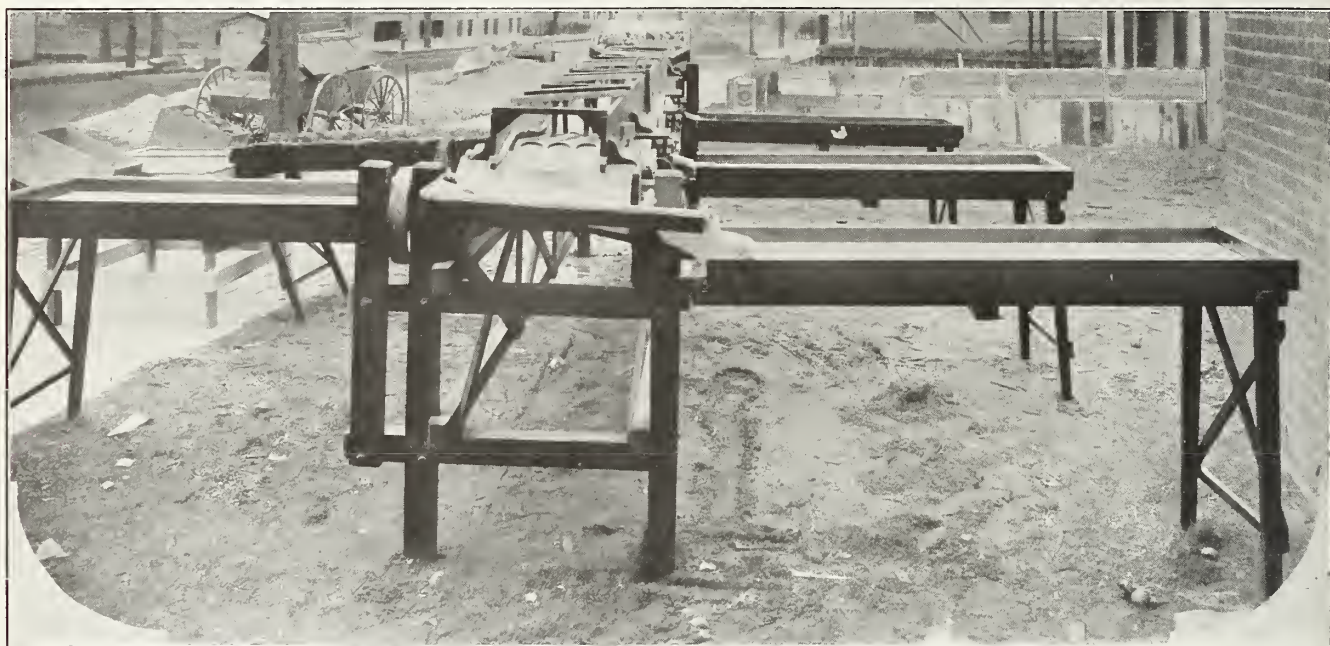
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*Hood River Apple Growers' Union*  
HOOD RIVER, OREGON

## Co-Operation in the Handling and Marketing of Fruit

By G. Harold Powell, Pomologist, United States Bureau of Plant Industry

THE handling and marketing of crops through co-operative associations is more highly developed in fruit growing than in any other agricultural industry in America. These organizations are formed to purchase the supplies used in the production and marketing of the crops; to standardize the harvesting, handling, grading and packing of the fruit; to sell the fruit of the members as a unit under whatever system of marketing is adopted; to prevent disastrous competition by bringing about an equitable distribution throughout the country and to handle the fruit business in other ways, collectively and effectively. There are several hundred of these associations among the fruit growers of the Western States, and a number that are successful among the fruit growers in the Central West and along the Atlantic Coast.

Fruit growing is a highly specialized industry in the Western States. The growers have often had extensive business experience before engaging in horticulture. The industry in the West is confined to the valleys and foothills, or is more or less geographically localized in other ways. Land values are usually high in comparison with the price of land in the East, cultural practices are more expensive and intensive,

the markets are thousands of miles distant and the problems of production, transportation, distribution, marketing and legislation are too complex for the average individual grower to meet and solve alone. Under these conditions co-operative effort is a business necessity, just as the consolidation of capital in other industries is necessary for its own preservation. The production, buying, distribution and selling of crops must be accomplished by working together. Things must be done in a large way if the fruit grower is to deal on the same level with the combinations of capital with which his product comes in contact at every step from the orchard to the consumer. The Western fruit growers have, therefore, formed associations of various kinds to work out the problems that confront them. At the foundation of the semi-arid Western horticulture lies the necessity for irrigation, and the irrigation systems, which are largely owned and controlled by the farmers, form a common tie which binds them closely together and makes co-operation in other things more easily accomplished than is the case in the humid fruit growing sections of the East. They may co-operate to protect the orchards from insect pests and diseases, or from frost; to pick the fruit,

to prepare it for shipment and to direct its distribution, storage and marketing. They may own outfits for spraying and fumigating, packing houses that cost thousands of dollars and storage plants of large capacity. They may develop a system of distribution and of market reporting which keeps them in daily touch with the markets in every part of the United States and Canada, and with the general movement of fruit in transit. They may advertise their products extensively, and through their organizations handle the legislative and other public policy questions that vitally affect the industry.

In the central and eastern parts of the country the growing of fruit is not usually specialized or localized. It is more likely to be an incidental feature of the general agriculture of a community. It is slowly developing into a specialized industry, especially in many sections of the East and South, though it is still largely in the hands of men whose only experience has been gained on the farm. In the eastern half of the United States, where irrigation is not required, the difficulties of production are more easily overcome, competition among fruit buyers is more or less keen, markets are comparatively close at hand, and the problems of transportation and of marketing are not as



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15,000	Stayman Winesap
60,000	Wagener
3,000	Wealthy
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200,000	Peach—All varieties
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acute as they are with the Western fruit grower. The need of co-operation has not faced the Eastern fruit grower as squarely as it has the grower in the West. Hence the co-operative movement has been of slower development in the East, except in such industries as grape growing in Western New York and the citrus fruit industry in Florida, where the stability of the capital invested has been threatened as a result of a haphazard system of individual distribution or of local selling and marketing. Under these conditions there have been formed virile organizations of growers for the distribution and marketing of the products, and such organizations, when properly directed, have been successful.

Co-operation among farmers is more difficult to effect than the consolidation of capital in other business enterprises. The farmer is the most individualistic of American citizens. It is not easy for him to transact his business with his neighbors. Independence in handling his affairs is a tradition that has been his for generations. He would rather conduct his business man to man, as his fathers have done before him, unless necessity compels him to do otherwise. The co-operative movements that have been organized among prosperous fruit growers have usually failed. The social, the political or the altruistic motives have not been strong enough to hold a group of money-making farmers together. Until recently the only successful co-operative efforts

have been those which have been born of desperate necessity. Co-operation must be effected when the fruit industry is at low ebb to have the virility to live in the face of the attacks to which all such efforts are at first subjected, but after the growers have learned the power of co-operation as a business opportunity their organizations become permanent and exert a powerful influence in the development of a better social life, and through their participation in the progress and management of rural affairs in the development of a better citizenship. No other agency is so powerful in bringing about better farming, better methods of handling the industry, a greater prosperity and a better community than a group of farmers who are successfully organized to protect and develop their agricultural interests. The American farmer is beginning to realize that the powerful influence of consolidated capital has been the source of the tremendous industrial progress of the last generation. He is beginning to take a greater interest in the possibilities of co-operative action when applied to his own problems.

There are many kinds of co-operative associations among the fruit growers of the United States. In a non-profit association, which represents the ideal type of co-operation, the members usually have an equal voice in its management and share proportionately in its benefits and risks. Such an organization is a vol-

untary industrial democracy in which the fruit growers manage and control the distribution and marketing of their own products. Every member of the association is a bona fide producer, and his fruit is handled exclusively by the association. All of the operations are carried on at cost, and after operating expenses, depreciation and a reasonable interest on the capital invested in the equipment of the association are deducted, the profits are distributed to the members in proportion to the amount of business each has transacted through the organization. The powers of the association are vested in a board of directors, selected by the growers, who manage and control its affairs and business through officers or agents appointed by it and subject to its advice and direction.

The first step in organizing a co-operative association is to incorporate it under the laws of a state. This usually has to be done under the laws that authorize the formation of stock or membership corporations, as few of the states have provided for the incorporation of non-profit co-operative agricultural or horticultural associations. The association needs to be incorporated on broad lines. The articles of incorporation should set forth the purpose for which the association is formed and should provide for every activity in which it may wish to engage. They should define the principal place of business, the life of the association, the number and



power of the directors, the voting power and property rights of the members, the amount of the capital stock and all other things of a general nature that are needed to be included in the incorporation of such a body. A code of by-laws needs to be adopted for the government and management of a co-operative association. The by-laws should define the method of exercising the power of the corporation through the board of directors and the officers appointed by it, the conditions surrounding the admission of members, the dues or stock to be paid by each and the conditions surrounding same. They should provide broad powers for the manager, including the supervision of the harvesting, grading, packing, distribution and sale of the fruit or for such of these operations as the association may wish to perform. They should define the grades to be adopted by the association for each kind of fruit. They should contain a provision by which the grower gives the association the exclusive right to market the fruit, with the possible exception of the lowest grades and to harvest, grade and pack. This includes the selling of the fruit for the members either as individuals or through pools, a penalty to be collected by the association for every package sold outside of the association. The objects are attained by the signature of the farmer to the by-laws of the association or the association may require a special contract to be executed with the co-operating

member. The methods of providing money for operating expenses, such as a fixed assessment against every package of fruit handled by the association, with a method of prorating the balance if the total amount of the package assessment amounts to more than the operating expenses, and other things usually included in such organizations should be set forth in the by-laws.

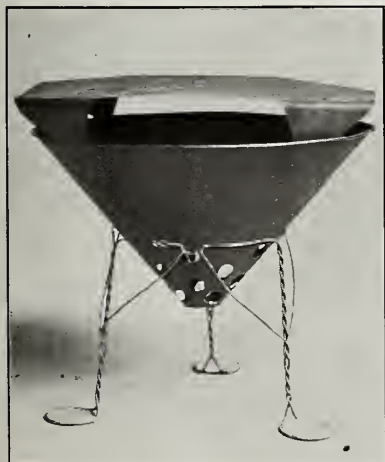
The fruit growers' organizations vary in form from joint stock companies, composed of growers or dealers or both, who distribute their own products or the products of others to the simple non-profit form of co-operative association which purchases the supplies and distributes the products of its members at cost. The voting power of the members in the different associations varies from a single vote for each member to a vote proportional to the amount of stock owned by each, or to the acreage held by each. His voting power may depend on the probable crop production or the actual production of the preceding year. The capital may be contributed in limited amount equally by each member in proportion to the acreage held by each or to the probable production of each member, or unequally, without reference to either of these factors. It may be contributed by business men who are not fruit growers, but who desire to encourage the formation of associations; or the capital stock may be subscribed as an investment, and a high rate of interest

paid on it before the profits are distributed to the growers. Some of the associations handle fruit on speculation, or for non-members at a specified rate per package. All of these types of so-called co-operative associations and many others are in operation with a greater or less degree of success. The most virile and effective from the standpoint of the producer are those which are strictly co-operative, non-profit in type, each member contributing an equal amount of capital, and having an equal voice in the management or a voting power and capital contribution in proportion to the acreage of bearing fruit held by each. The association handles the fruit of the members only, and the fruit is under the control of the association from the tree to the market. The objection urged against this form of organization is that the small grower has an equal voice with the large grower in fixing the policies of the association. The objection to the voting power based on acreage is that the exceptional grower has no more influence than a poor grower of equal acreage. There is equally strong objection to the form of power based on production, as the pro rata of production may vary with the seasons.

Not all of the co-operative associations are successful. In fact comparatively few of them have been distinctly successful, especially among the early associations formed before the citrus fruit growers of California organized

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to distribute their products and to protect the capital invested in their industry. The citrus fruit organizations, most of which are founded on the true co-operative, non-profit basis, have had a far-reaching influence on the co-operative movement in the United States. The orange and lemon growers of California have the most powerful and successful organizations to be found in any agricultural industry in the United States, if not in the world, one organization, acting as an agent in distributing \$15,000,000 worth of fruit a year for its six thousand members, organized into more than a hundred associations on a non-profit basis. This agency sends fruit to every part of the United States and Canada, and to several foreign countries, maintaining its own exclusive representatives in all of the principal markets of America. Many of the co-operative associations organized in recent years have been formed on the principles that underlie the citrus fruit associations, and these, when wisely managed, have shown great strength.

Several factors have contributed to the downfall of fruit growers' associations. Many of them have been formed by impractical, often unsuccessful, enthusiasts with high motives, but with no business experience and little standing in their communities. Others have been formed ahead of their time, when the industry was too successful for the members to be held together. Many of them have been managed by

incompetent, low-salaried men, not infrequently by those who have been unsuccessful in business. The successful handling of a co-operative association requires a manager who is competent to assume the general direction of the affairs and business of the association. He must have a high order of business ability, sterling integrity, unusual tact and judgment in handling men and unlimited energy. An association under any other kind of management is not a serious business undertaking. It is more difficult to direct a co-operative association than a stock company or corporation. In the latter the manager is responsible to a board of directors, but the stockholders do not often take an active interest in the management of its affairs. In the co-operative association the manager is also subject to the advice and control of the board of directors, but the farmer who joins with his neighbors in an association is likely to take more than a passing interest in the management of the association. A manager who cannot hold the interest and the confidence of the members, who cannot make them feel they have a voice in the management, and who fails to develop a progressive, constructive business policy will fail in handling a co-operative organization. Nor can such an organization succeed if the directors do not realize that it must have a strong, competent, aggressive, well paid manager at its head. It is

not too much to say that no single factor has operated against the success of the co-operative associations as much as the incompetent managers selected by the directors of the associations to handle them. A board of directors cannot manage a co-operative agricultural association. The outcome of the organization will be determined in a large degree by the character and ability of the manager.

Another factor that has operated against the success of many so-called co-operative associations has been the payment of high dividends on the capital invested, the stock having been subscribed unequally by a comparative few of its members. The organization in which the business is not transacted at cost cannot hold the confidence and support of its members. The payment of one or two high dividends on the capital stock before the proceeds are distributed to the growers has caused the downfall of many associations that have been well organized in other respects. Another dangerous element has been the ambitious effort of new associations to buy and sell fruit and supplies outside of the membership. The speculative element must be rigidly excluded from co-operative associations. The harvesting, grading, packing and handling of fruit not grown by members invariably leads to a lowering of the established standards of grading and packing, and to injury to the reputation and financial standing of the association.



Many of the co-operative efforts fail through the disloyalty of members, when the association is subjected to the skillful, insidious fire of those who oppose it. The farmer is not used to having his business attacked, and those who are interested in disrupting the organization appeal directly to his pocketbook by attempting to show that the association does not realize as much for the fruit as the farmer could realize outside the association. They also persistently insinuate that the association is grossly mismanaged. It is a favorite practice of the opponents of co-operative distribution and selling to offer association members a premium for their fruit. The apple grower is tempted by a premium of twenty-five to fifty cents a barrel over the probable returns of the association; the peach grower by an advance of ten to twenty cents a box or basket, and the pear or small fruit grower by an equally attractive bonus. The man with a small crop and a still smaller capital often falls before this kind of temptation, and if it is held out long enough the association may be disrupted. These devices are coming to be well understood, and the fruit grower who joins an association in good faith and sells out for a small premium is in danger of losing the respect and confidence of his neighbors.

It is a fundamental necessity that the members be held together by a contract or a provision in the by-laws

which gives the association the exclusive right to pick, pack, haul, grade, mark and sell the fruit of its members, or to perform as many of these operations as it may decide to perform, or to supervise or regulate these operations under rules made by the association. The contract should be drawn for a term of three to five years, giving the grower the privilege of withdrawing by notice at the end of any fruit year, thereby making his continued connection with the association voluntary. The contract should specify a penalty to be assessed against every package of fruit sold outside of the association, this penalty to equal not less than twenty-five per cent of the value of the fruit. Under any other plan an association cannot build on a solid foundation. It cannot foresee the probable volume of business to be transacted, nor can it provide the means to purchase the supplies for handling the crop or reach that degree of stability that is essential to the success of a business undertaking. The membership contract with the grower is the foundation stone on which the business of the association is reared, and without which its existence and stability are problematical.

In every co-operative association there should be a division for the purchase, sale or manufacture of supplies of every kind used in the production, packing, handling, shipping and marketing of the crop. The association should be prepared to purchase fer-

tilizers, materials and equipment for spraying and fumigation, the facilities used in frost protection, pruning, harvesting, orchard machinery, or any other equipment on which a saving can be made by co-operative purchase. It should be prepared to purchase the supplies for fruit handling and marketing, such as box shooks or packages, picking boxes, nails, wrapping paper and all kinds of packing house equipment. The money needed to operate this purchasing division may be raised by assessment, by the individual notes of the directors of the association, or in other ways. The association should sell the supplies to the members at a fair market price, and at the end of the season should prorate the surplus to the members or invest it in the business, after deducting the operating charges, depreciation and other necessary expenses, including interest on the assets and capital devoted to this supply division.

The condition in which fruit reaches the consumer depends largely on the care with which it is handled. The most common rots of apples and pears, of small fruits and of citrus fruits are directly related to the mechanical bruising of the fruit, most of the diseases not having the power of penetrating a healthy, uninjured skin. The association must, therefore, provide rigid rules for picking. It must either supervise the harvesting, grading and packing of the fruit, and provide for the most rigid inspection of every lot



Sept. 15, 1911.

Hood River Standard Nursery Company.  
Hood River, Oregon.

Gentlemen:-  
Last Fall through the Baltimore Orchard Company, I purchased a quantity of assorted apple trees from you, the same being shipped to me by freight.

My idea in going to Hood River for trees was that the delicious and attractive fruit that is shipped into this market from Hood River impressed me that surely a community that could grow such fine fruit, certainly ought to be in good position to supply equally as good trees, and it gives me great pleasure to state, that out of the quantity that I purchased from you, not one of the trees have died nor are they blemished in any way whatsoever, and the growth far exceeds other apple trees purchased in this vicinity and planted at the same time.

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also, that all of our trees are grown on whole roots, non-irrigated—are bred from the greatest producers and most vigorous trees in Hood River Valley. They are the most carefully grown and carefully packed trees that you can purchase. They are in every sense a strictly thoroughbred, pedigreed fruit tree. They cost no more, BUT THEY ARE THE KIND YOU NEED.

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before it is accepted by the association for shipment, or else the harvesting, grading and packing must be done by the association. In most of the associations where the fruit is not packed in central packing houses it is picked and packed by the grower according to the rules of the association and inspected by an employe of the association before it is accepted for shipment. The system works fairly well with the small fruits and the deciduous fruits which have to be handled quickly from the field to the consumer. It is not a satisfactory system to apply to the citrus fruits, or to the apple or pear crops. With these the handling, grading and packing must be standardized, and this can be done only when the association controls all of the handling operations or actually performs them. Many apple associations establish rules of grading and packing. The association grower picks and packs the fruit and the association accepts or rejects it by inspecting the packages when delivered at the railroad station, the association warehouse or some other point. Experience has shown that the grower can rarely be depended on to pick and pack the fruit in the best manner. It requires skilled labor. Fruit grading and packing is an art that is acquired by few individual fruit growers, therefore an association who operates on this principle seldom reaches the highest degree of success, and is likely to fail outright. A better plan is to have the grower pick the fruit when directed to do so by the association. It is then graded and packed according to the rules of the association in the orchard, or in the fruit house on the farm by trained men in the employ of the association. Under this plan the grading and packing of the fruit of the entire membership can be done with comparative uniformity. Even then the packages need to be inspected before they are accepted by the association. Every package rejected should be regraded and repacked or placed in a low grade. This system is in operation in several of the most successful co-operative apple growers' associations in the United States. Another plan is to grade and pack the fruit at a central packing house owned and controlled by the association. The growers pick the fruit, haul it to the packing house,

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Frank W. Stanton

Of the firm of Frank W. Stanton & Company, southwest corner Dock and Walnut streets, Philadelphia, who advises us that they are leaders in fancy fruits, handling the best apples coming out of the Cumberland and Shenandoah Valley districts, and they are also anxious to connect with Northwestern fruit dealers in the apple business. This firm is also interested in the orchard business near Keedysville, Maryland, where they have 400 acres in peaches and apples.

and there it is graded and packed by the association. This is the plan that was formerly in general operation in the orange and lemon growing districts, and is followed to a limited extent at the present time. The objection to this plan is that no two growers handle the fruit with equal care, and the different lots of fruit, therefore, vary in physical condition and in susceptibility to decay. Under this system there is a wide variation in the percentage of decay that develops in the fruit of different members while in transit to market. If the fruit is pooled the grower who handles his fruit carefully has to share the losses that develop in the fruit that has been carelessly handled. The most satisfactory plan in the citrus fruit industry (and this may be applied to some other fruits) is to have the association train gangs of laborers who shall pick the fruit of all of the members. The laborers should be paid by the day, as contract or piece work places a premium on rapid, careless work. In this way the picking can be standardized, the quantity of fruit that passes through the packing house can be controlled, and the grading and packing can be uniformly done. This system has been generally adopted in the citrus fruit industry as a result of the investigations of the Department of Agriculture into the causes of decay in oranges and lemons while in transit from California to the East. This investigation showed that the decay was the result of the improper handling of the fruit in preparing it for shipment, and that it could be controlled by placing the handling of the fruit entirely in the hands of the associations. The same laborers often fumigate the orchards of the members for scale insects and spray the trees wherever spraying is practiced.

The tendency in the co-operative movement is toward a central packing house, where the fruit of the members is brought together and is graded and

packed for shipment. In the small fruit industry this plan is hardly practicable. It is sometimes successfully operated in the deciduous fruit and in the grape industries. There are about two hundred of these association packing houses in the citrus industry in California, and the Florida citrus growers are rapidly organizing along these lines. A packing house is erected by the association, usually alongside the railroad, and is equipped with the necessary appliances for fruit handling and packing, the manager of the packing house usually being the general manager of the association. Precooling and cold storage plants, box nailing and labeling machinery and other devices required in the industry are to be found in many of the association houses.

To be continued in next edition.

After the fourth year we do not attempt to maintain a permanent leader in fruit trees. I find very few trees naturally attain this, so I do not attempt it. Prune to a thin, open-top tree, in order that the sunlight may get in to color and develop the fruit. In the Kelowna region of British Columbia we have observed many growers attempting to grow a pyramid tree with a leader. We do not consider this the best tree to grow for fruit purposes. We feel that it is a good, strong framework that we can depend upon for crop production, rather than a leader.

#### Editor Better Fruit:

Kindly forward us by mail, with bill, one copy, recent date, of "Better Fruit." It may interest you to know that this order comes from our house in Paris. Yours very truly, Brentano's, New York City.

#### Editor Better Fruit:

Find enclosed check for two dollars to pay my subscription for two years. I can't get along without "Better Fruit." You will know how I value it when I say that I cleared the land and planted 650 trees last spring and lost only one tree, and "Better Fruit" has been my sole guide, for I knew nothing from experience. If I can succeed as well in growing the fruit I will be satisfied. Your truly, H. W. Scaave, Mosier, Oregon.

#### Editor Better Fruit:

You certainly have boosted the Apple Show game strong in your October issue. You used just the kind of stuff that would do us the most good among the growers, and you used so much of it, when I know how valuable your space is, that I feel that I cannot thank you enough for your kindness. It is the same old story of Shepard boosting his best for the other fellow's gain and asking no reward. I took the issue of "Better Fruit" to the trustees' meeting and showed it all around the board, and I was instructed to thank you as best I could for the trustees. I cannot express our sentiments in the way I wish, and I hope you will understand that we know you are about the best friend we have. Sincerely, Ren H. Rice, Spokane, Washington.

#### Editor Better Fruit:

The fame of "Better Fruit" has reached a foreign land. We know this for a variety of reasons. We recently had an inquiry from a point in Northern Ontario, Canada, for further information on our spraying outfit, as advertised in "Better Fruit," and later on two more inquiries from British Columbia reached us. Today we are in receipt of a request from the Canadian Fairbanks Company, Vancouver, B. C., for a copy of the "Better Fruit" number containing one of our ads. Will you kindly mail them a copy of this, and, by way of suggestion, we might add that a subscription blank enclosed might meet with a suitable response. Yours very truly, Fairbanks, Morse & Company, by G. K. Towerel, Portland, Oregon.





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## Fall Planting of Trees and Vines

THE question is often asked, when is the best time to plant trees and vines? A writer in the Journal of Agriculture answers it by saying that in his experience—which covers many years—fall planting is preferable for most trees and vines. After many years' planting in fall and spring, my experience convinces me that fall planting, in most species of trees and vines, is much the best. In fall planting they get the benefit of winter and early spring rains, which, in some years, make double the growth. The trees that should be planted in fall or

during the winter when the ground is not frozen are cherry trees, plum trees, pear, apple and most other trees. Peach trees may be planted in the spring, but I have planted them in the late fall and winter, and they made a better growth than those planted in spring.

One of his strong objections to spring planting is that the work often has to be delayed until late in the season because the ground is wet. It is never advisable to set a tree in a soil of the consistency of mud. As regards the method of fall planting he says: In fall planting the dirt must be banked around the tree from six to ten inches high and in spring, as soon as the leaves begin to come out, this mound should be leveled down. This answers for the first cultivation. For this leveling I use a four-pronged potato digger, prongs standing like that of a hoe. Currants, gooseberries, pie plant, grapes and all vines that are propagated from cuttings and layers are much the best planted in fall, after

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the leaves are killed by frost or during open spells in winter.

Not all plants, he says, are adapted to spring planting. He makes these exceptions: Blackberries and the red raspberries that grow from sprouts and root cuttings like blackberries, raspberries that are propagated from the tip end by layering, and strawberries, as a rule, grow best planted in early spring, but I have been having good results planting in late fall and winter by mulching two or three inches with strawy manure. This protects them from freezing and thawing and heaving out of the ground.

Planting should be done in fall after the frost has killed the leaves. Great care should be taken to prevent the roots of trees and vines from getting dry while they are out of the ground. If received early in the season, or before the ground is ready for them, they can be kept in good condition by burying the roots in moist earth and covering their tops with straw. If the ground is not frozen, planting can be done late in the season if care is taken to use fine soil in filling in about the roots when the trees are set out. Make this firm by tramping it down or pounding it with some heavy, blunt implement. The writer gives this advice in conclusion: Be sure not to lose the tags with the names of the trees on them, as it is very vexing to have an orchard or berry patch and not know the names of the varieties.

### Editor Better Fruit:

I have just received the copy of "Better Fruit" this morning and wish to thank you for the most liberal donation of space in your paper for the benefit of the apple show. While all issues of your paper are good, the last one I think one of the finest ever published, as the statistics you have gathered are of great value to growers. Yours very truly, Frank W. Power, Secretary Oregon State Horticultural Society.

## Protect Your Trees

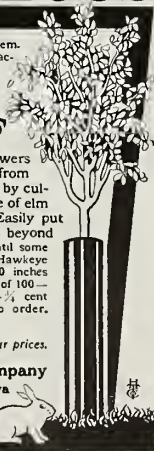
DON'T take chances with your young trees. One rabbit will kill many in a single night. Mice and cut worms will damage and destroy them if you don't protect them. Get dollars' worth of protection at a fraction of a cent cost by using:

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## Pruning Pears, Cherries and Walnuts

By J. M. Jenne, Prosser, Washington

AS I was lately and unexpectedly asked to prepare an article on some subject of my own choosing, I decided to say something concerning the care, culture and pruning of the peach, walnut and cherry trees. I do not remember of ever hearing this subject thoroughly discussed. I shall begin my discussion with a few pertinent remarks concerning peach culture. I do not see why we should pay more for a peach tree than for an apple tree. I should rather raise the former. By planting the pits in the fall or winter and budding the young trees in July or August you can still get some growth that season. I have had them grow as much as two feet the same summer they were budded. If the budding be done in the fall before the tree stops growing the bud will have time to heal in nicely, and the following year you will have a very vigorous tree. When planting the young trees I top them back to from fifteen to eighteen inches, and leave no less than three and no more than five branches. The peach tree will grow good branches the first season, and every season thereafter the trees should be pruned back two-thirds or more. This should be continued so

long as the tree is good. By this method the fruit is larger and the tree more vigorous than if a lesser amount of pruning were done. The tree will also not have any dead wood in it and will live to more than twice the age it would have attained otherwise. This method of pruning will also save much time in thinning the fruit, as the trees are not so apt to be crowded with fruit. Care should be taken to keep the peach tree open enough to allow the same amount of sunlight to pass between the branches, thus insuring well developed and well colored fruit. Care should also be taken to insure an erect and well balanced tree. A tree should not be pruned too heavily on the southwest side, as that is the direction from which come the prevailing winds, at least in this immediate vicinity.

I shall next discuss the walnut. If I can possibly get the nuts from the first or second generation of a grafted tree I prefer planting them. I obtain better results by planting the nuts where I want the trees to stand permanently than by transplanting the yearling trees. If the two methods were tried it would be found that in three years' time the trees grown in

their permanent planting places would be far ahead in growth of those that were transplanted. In transplanting a walnut tree the tap root, which is a great support to the tree, becomes destroyed, thus making it less able to withstand the winds. In a commercial orchard a walnut tree should not be allowed to branch until the trunk is five to eight feet tall. In this way the tree will not be bushy and the winds will have very little effect on it. After the tree is headed properly it should be almost entirely left alone. Should there be too many new shoots they can be cut away, but should never be topped back.

As to variety, I think some species of the French walnut is the best for this climate. I know of one that

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comes out about two weeks later than any other in the spring, and thus it escapes the late frosts. It will also bear fruit in two years after being budded or grafted. For a shade tree this species of a walnut cannot be excelled. It has a very large leaf, a fine, clean body and is almost entirely free from insect pests. It can be successfully grown with the trunk fifteen or eighteen feet to the first branch, and yet in fifteen or twenty years' time these limbs will be low enough so that the fruit from them can be picked from off the ground. I have seen a roadway several miles in length with these trees growing on both sides. They were from three to four feet in diameter and seventy-five to ninety feet tall. The limbs were completely interlaced overhead. Most of these trees produced from fifty to one hundred bushels of nuts in a single season.

The cherry trees, like the walnut, will grow to a good age and attain a good size, provided it is planted in good, well drained soil. In dealing with the young tree, it should be headed lower than the walnut tree unless it is to serve the purpose of a shade tree, then it should be headed high. A cherry tree should not be cut back often, as such treatment will cause it to bleed and form a gum or wax, and thus check the growth of the tree or ultimately cause its death. I handle it otherwise, like the walnut.

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This attachment is the only one ever devised for the protection of small fruits. The adjustable cover enables the grower to have perfect control of the heat, which is deflected downward, thus holding it near the ground.

If you are a grower of strawberries, raspberries, grapes, currants or vegetables don't fail to send for our illustrated catalog. This book takes up every phase of orchard heating, giving full information regarding the number of heaters to use to the acre, how to store your oil, placing, filling and lighting the heaters, and is replete with testimonials from well known growers all over the United States who have used and stand by the Troutman Orchard Heaters and the Small Fruit Attachments. Take time by the forelock and drop us a post card and get this information, which is of inestimable value to every orchardist, gardener and fruit grower.

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# The Kimball Cultivator

maintains this high state of cultivation in the orchards on the Morrisania Ranch in the Grand Canyon of the Colorado, owned by the Fruit Grower, of St. Joseph, Missouri.

## Smoothing Land for Irrigation

As an implement for smoothing land for irrigation, the Kimball Cultivator has perhaps no equal, since it cultivates the soil and smooths it at one operation. Many fruit growers who practice irrigation use a drag or float to smooth their soil previous to running irrigation furrows, and this work is of little or no value in cultivating the soil—it simply smooths the surface, so that irrigation furrows can be better made. If the soil is not smoothed, there is often great trouble from the water breaking over or through the furrows. When the furrows are made in smooth soil there is likely to be little trouble experienced.

At Morrisania Ranch, near Grand Valley, Colorado, the land has a rather heavy slope, and irrigation is best practiced with the furrows running diagonally with the slope. If the furrows are run in rough soil, there is always a tendency for the water to break through the furrows and run straight down the hill. Formerly the soil was dragged just before the furrows were run, to smooth the soil properly. This was extra work, for the smoothing process was of little benefit otherwise.

During the season of 1911 we bought two Kimball Cultivators from W. A. Johnston, The Dalles, Oregon, and did away with the use of the float altogether. Our method was to use disc harrows after the irrigation, just as soon as the soil was dry enough. This cultivation filled in the furrows and made a mulch to hold the moisture. Within a week or ten days weed seeds sprouted and another cultivation was needed, and here the Kimball Cultivator was used. It killed the weeds, made a perfect dust mulch, and left the soil in ideal condition for the irrigation furrows. If weeds started again before irrigation was needed, another cultivation was given with the Kimball, and the soil was still left just right for the best irrigation furrows to be run when needed.

We were much pleased with the Kimball Cultivator, as a weed-killer, a thorough cultivator and leveler, and as a saver of time. One good man covered a great deal of ground, using one good team. The cultivator works up close to the trees, leaves the soil level and smooth, with just the right kind of dust mulch, and, altogether, we were much pleased with the Kimball and its work. Our crop at Morrisania was a very good one, the apples being of high quality; trees made a very vigorous growth, and there was no skinning of trunks or limbs by the cultivator. In soil which is not stony, the Kimball Cultivator cannot be beaten, where one does not allow the weeds to get too large, and it is especially adapted to use in irrigated orchards for the reasons given in this article.

JAMES M. IRVINE,

Editor The Fruit-Grower, St. Joseph, Missouri.

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## W.A. Johnston, Manufacturer Kimball Cultivator

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## Hints on Setting and Trimming Young Orchards

By Professor R. W. Allen, Experiment Station, Hermiston, Oregon

**T**REES that are correctly planted have a great advantage over those that are carelessly put in. It should be the aim of each planter to give his trees every advantage, for by so doing he greatly increases his chance for success in the work. The best way to care for trees while planting is to keep them covered to prevent the roots from drying out. It is not a good practice to distribute the trees over the field before planting, the better method being to wrap a small number in a cloth and carry them along. When each hole is dug take a tree from the bundle, remove all injured roots by cutting off smoothly and place them in the hole. The hole should be made large enough to accommodate all the roots without bending or cramping them. The dirt should be carefully worked in about the roots and pressed down firmly by tramping several times while filling the hole. The top three or four inches of soil should be left loose to prevent the rapid evaporation of moisture from the soil below. It is advisable to set the trees about two inches lower than they stood in the nursery row, for in light soils they need to root deeper, and when firmly placed are

not so easily whipped around by the wind.

By the time a tree is set out in the orchard it has lost the greater part of its root system. From this loss of roots there is a corresponding lack of balance between that part of the tree and the top, under which condition the tree is unable to thrive as it should. To remedy this trouble the tops must be cut back quite severely. When put out in the spring the tops should be removed at the time of setting, for evaporation of moisture from the tree takes place to a limited extent in dry air, and is quite rapid on warm and windy days. When all the top is left on the tree is in danger of becoming sufficiently dried to kill it before root action begins, or to prevent it from making a satisfactory growth after the growth starts.

By placing one foot on each side of the body of the tree to hold it firmly in place remove the top at the desired height by an upward cut with a sharp knife or with a pair of pruning shears. Under the conditions which exist here trees should be headed fairly low, from twelve to twenty-four inches from the ground. When forked out close to the ground they can be kept from growing so high; when kept low

they are easily gotten at with the spray, are easier to thin and pick fruit from, thus making the cost of care considerable less. Trees that are caused to grow close to the ground are not so seriously affected by the wind, and the branches shade the trunks and prevent losses from sunscald. In the orchards where the trees are headed several feet high there is usually considerable loss from this trouble. The heat from the sun, with additional heat reflected from the ground, becomes too intense, and the bark is scalded and killed.

### Editor Better Fruit:

Enclosed you will please find draft for another year's subscription to "Better Fruit." We feel that we could not get along without your publication, although we have a number of other fruit journals and trade papers coming to the office. H. H. Younger, Manager Palisade (Colorado) Fruit Growers' Association.

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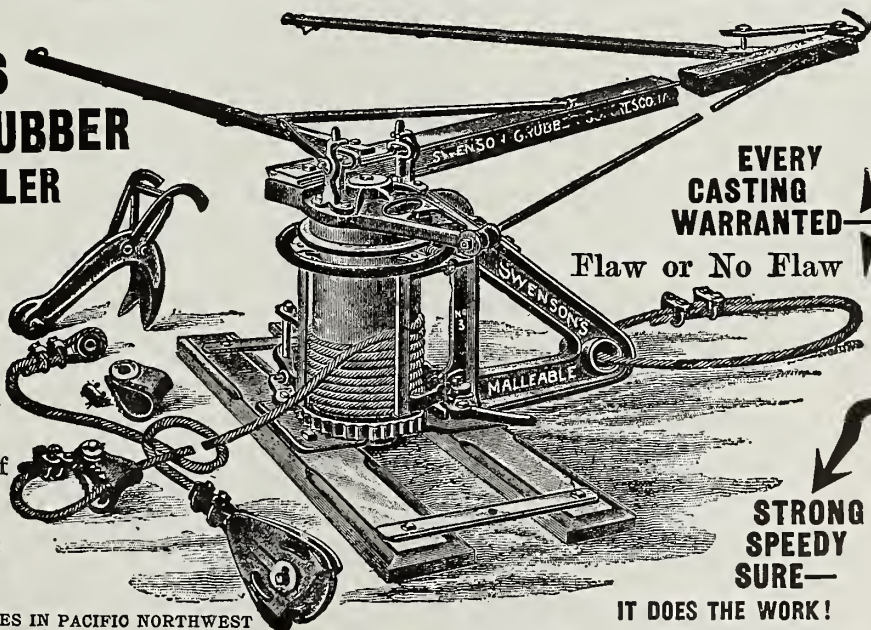
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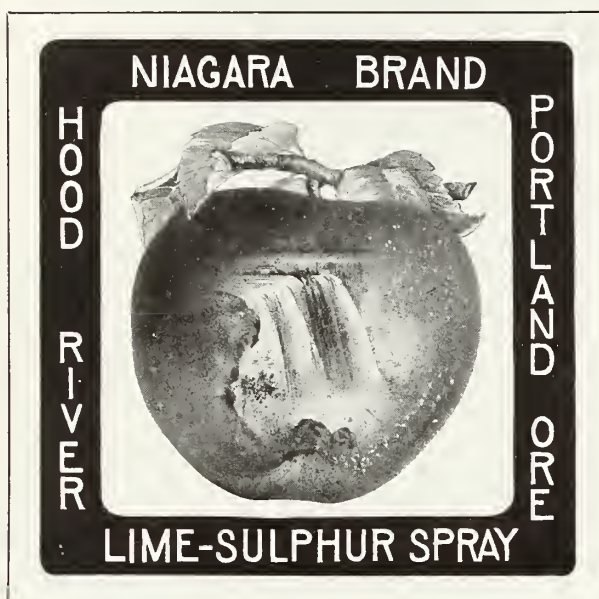
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## When to Plant and How

By George C. Roeding, Fresno, California

IN California radical differences in soil and climate are often to be met with in the same orchard, and one locality is often blessed with as great a diversity as may be found in a whole state east of the Rocky Mountains. Hence local horticultural conditions are of prime importance when planting for profit is the consideration. Indeed, it is our experience that it is the very keynote to the successful prosecution of fruit culture as applied to California and the Pacific Coast.

Taking it for granted that the intending planter is reasonably familiar with local conditions prevailing in his locality and on his land, a few suggestions on methods of planting will be found timely. Obviously it is of the utmost importance that the land be put in

first class condition to receive the trees. This is accomplished by thorough plowing, followed by harrowing until the soil is friable as an ash heap. Nothing is so beneficial to soil as sub-soiling, though planters are often deterred from incurring this additional expense, but where time and conditions will permit it will do more to promote a fine, deep root system and an unusually heavy growth than any other one thing that can be done in the preparation of the soil. A sub-soil plow merely consists of a standard about twenty inches long attached to a wooden beam like an ordinary plow, except that it is heavier. It has no mould-board, but merely has a flattened piece of steel at the lower end of the standard, which is slightly concaved so as to lift the soil as it passes underneath. It runs in a furrow made by a single plow, and at a depth of eighteen to twenty inches. It requires from ten to twelve good animals to pull it.

Where irrigation is practiced grading must be resorted to, so that all spots will be accessible from the laterals running from the main ditch. Grading does not necessarily mean leveling, for the less the surface soil is moved the greater will be the ultimate success of the undertaking. No greater mistake can be made than to cut down

the surface of the land for several feet in order to bring it under a ditch. It is far better under such conditions to pump the water from a ditch to the higher level, and thus preserve the land. The slight additional expense of pumping will be more than counter-balanced by the growth of the trees and their fruitfulness, as compared to the poor growth and lack of fruit when the surface soil has been removed to any depth. Drainage should be given consideration, particularly if the land is low and liable to have water stand too near the surface during the spring and summer months.

Early planting is always advisable in California with deciduous fruit, forest trees and shrubs. We do not recommend fall planting for the reason that our growing season often extends into the month of December, and to dig

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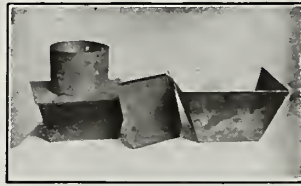
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up the trees until the growth is checked by frost, which rarely occurs before the latter part of November, is a very risky proposition. In the case of citrus trees and evergreens, plantings should commence in the late spring and may continue until the early summer months.

The trees, when received at point of destination, should be immediately unpacked and the roots laid in a trench and well covered with soil, which should then be thoroughly wet down. If delayed in transit, thereby becoming dry and suffering from exposure (the bark showing signs of shirveling), it is a good plan to immerse the trees in a tank over night, and the following day bury root and top completely in damp soil for a few days until they become normal, when they may with safety be planted out. Should trees be frozen while in transit place the package in a cellar or some other place free from frost until thawed out, when they can be unpacked and heeled in, preparatory to planting. Trees treated in this manner will not be injured by having been frozen.

In localities where the seasons are very much later than ours, due to higher elevation or to the difference in latitude, it is far better to have stock forwarded while in the dormant condi-

tion. If purchasers will call attention to the fact that extreme cold weather will not permit of early planting the nurseryman will defer shipping as late in the season as it is safe to do so. The shipment on arrival at destination should be examined by removing a board from the case, and if the roots appear to be in good condition the contents should remain undisturbed and the case should be placed in a cellar or in a cold storage plant, where the temperature should be maintained at about thirty-five degrees Fahrenheit. This method of handling trees is thoroughly practicable, so much so that it has been found possible to ship trees to the Antipodes during the winter season and have shipment placed in cold storage there until the opening of the planting season.

Just immediately before planting be sure to examine the roots carefully and cut away to a smooth surface all bruised, lacerated and broken roots and rootlets with a sharp knife. The tree can now be said to be ready for its permanent orchard home. If planting is delayed through circumstances beyond the control of the orchardist

and a warm spell should intervene in February or March, causing the buds of the trees or vines to start, remove them from the trenches, shake out all the dirt from the roots and expose them for three hours in the morning on a calm day to the rays of the sun. This will cause the small white rootlets which have started to dry up, and if the trees are heeled in (wetting them down, of course) in a shady place their dormancy may be prolonged several weeks. In setting out one person should hold the tree in an upright position against the notch in the tree setter while another shovels or fills in the loose soil around it, first spreading out the roots and rootlets in as natural a position as possible. The surface or friable soil should be put in first among the roots, care being taken to fill in every interstice, thus bringing all the roots in direct contact with the soil. When the hole is two-thirds full firm the earth thoroughly about the roots, but before doing this draw the tree up to its permanent position. The top three to four inches of soil should not be tramped. A basin should be scooped out around the tree which will hold at least ten gallons of water, and unless heavy rains should intervene to fill it up water should be applied either by bucket or by irrigation. The following day draw in loose soil to fill up this basin, reducing it to a fine condition of tilth, but do not tramp in. Guard against setting too deeply, but allow for the settling of the soil, so that when once established the tree will stand about as it did at the time of removal from the nursery rows. In the hot interior valleys of California it is also very important to protect the trunks with Yucca tree protectors until they can supply their own shade.

As has been suggested previously, above all things have your ground in the very best condition of tilth. The

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importance of this one point cannot be dwelt upon too forcibly, for it not only insures more rapid work on the part of the men setting your trees, but in addition to this, not having any clods to contend with, the fine loose soil packs around the roots when tramped in, and if for any reason there should be no opportunity of settling the trees with water after planting there is very little danger of their drying out. Before proceeding with the planting of an orchard or vineyard the land should be laid off having one side and end of the field at right angles. When there are no regular subdivisions to work from, and particularly where extensive plantings are to be carried on, these base lines should be established with a transit. Nothing is more unsightly than to have your trees or vines out of line, and by following out the suggestion of having these base lines at right angles there is very little probability of this occurring. There are two methods of planting, the square, which is the most universally used, and the equilateral triangle. A stake about half an inch square and one foot long split out of redwood will be found to be a very convenient size as a marker for the setting of the trees. Dip about six inches of one end in whitewash, as they can then be readily seen, and should any of the stakes be out of line it will be noticed at once. Before digging the holes it is necessary to have a tree setting board. This is easily made out of a piece of 1x4 four feet long with an inch hole at each end and a notch in the center. Place the notched center against the stake where the tree is to be planted and push a stake into the ground through the holes at each end of the planter and remove the center stake. The hole may now be dug, and this should not be less than eighteen inches in diam-

eter and eighteen inches deep. After the hole is dug replace the board over the end stakes in its former position, then plant the tree with the trunk resting against the center notch in the board and it will be in identically the same place as the stake which was removed to dig the hole.

**The Square Method.**—Having the corners fixed, the next step is to lay off the ground. In order to fully understand the matter we will suppose that the trees are to be planted twenty-four feet apart. To set stakes for ten trees for each stretch of the wire it will be necessary to have a wire 240 feet long with a short two-foot link at each end for a three-inch iron ring, through which the iron pegs are pushed into the ground after it is drawn taut, to hold it in place. Use a No. 10 gauge galvanized wire and at each twenty-four-foot point have a small piece of wire wrapped around it and soldered into place. Before proceeding with the laying out of the ground set stakes twenty-four feet apart along one of the base lines. Having set the stakes along the outside line, start at the same end of the field again and set another line of stakes, parallel with the first line and the length of the chain distant from it. Follow out this method until the entire field is laid out in checks. With the check lines established it is only necessary now to set stakes at the twenty-four-foot marks on the wire where the trees are to be planted.

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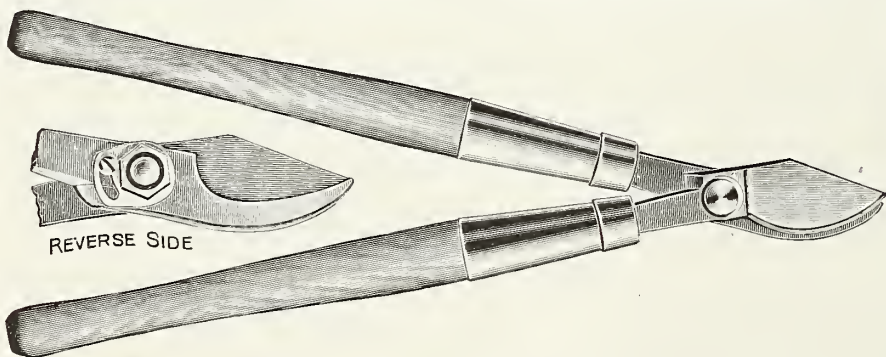
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Fruit growing is a business pure and simple, and in its successful operation is quite as apt to call forth the best energies of brain and brawn of those who are in the business as in any other line of commercial activity. Just in the proportion that the orchard receives intensive and intelligent care will it give corresponding returns for the investment of capital, time and labor. Above all things do not plant too many varieties if you desire to be a factor among the commercial fruit growers. No greater mistake can be made. As an illustration, in planting ten acres of peaches and having on each acre a different variety, when this orchard comes into bearing there are so many varieties and so limited a quantity of each that the commercial packer of dried or canned fruits does not feel inclined to pay what the fruit is worth because there is not enough of any one kind to make it an object for him to handle it.

Growers in new localities are often concerned over the fact that there will be no outlet for the product. The handling and marketing of fruit has assumed such vast proportions that there are always commercial institutions eager enough to enter a new field and exploit it as soon as the production is large enough to encourage the building of packing houses for the handling of any particular product. Another serious mistake on the part of many growers is to endeavor to harvest enormous crops when their trees are only two or three years old. The result of this unwise policy in many cases is to sacrifice the tree to such an extent that just when it should be bringing profitable returns (it was burdened to heavily when young) it either dies or it takes years of extraordinary care to restore it to its proper vigor. It is just as much a mistake to expect too much from a young tree as it is to require a child to do a man's work. The care bestowed for the first two or three years in cultivating, pruning and irrigating, where the rainfall is insufficient to carry the trees through the long, dry summer months, is the foundation for the upbuilding of a plant which will redound to the credit of the owner and give him ample returns for his intelligent care and years of hard work. The tendency toward overpro-

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duction in young trees is easily eliminated by pruning. Next to thorough cultivation there is nothing which is more vital to the life of a tree than this one thing. It is difficult to lay down specific rules on this point, but there are basic ones which can generally be observed in the handling of most deciduous trees, with some exceptions.

After a tree is set never fail to cut it back. This is now the general practice among the most successful orchardists throughout California, and is the result of years of experience. The following winter from three to four branches, properly distributed around the body of the tree, should be allowed to remain to form the head, and each one of these branches should have at least one-half of its growth removed, cutting away all laterals from them also. These leaders will eventually form the framework of the tree. Above all things do not shorten in a lateral

starting near the terminal point of any of the branches unless you wish to have a hideous crook in your tree. It is a great mistake to think that unless these small laterals are allowed to remain the tree will not start. The result of the first year's pruning will cause the trees to make an immense growth, and will also induce them to grow stocky. The second winter heavy thinning will have to be followed, and the pruning should be done with a view of causing the framework branches to spread out. After thinning half the growth of the current season should be cut off and again remove all laterals from the framework branches. To the novice this severe cutting seems suicidal, but the results obtained have been so very satisfactory that the soundness of this method cannot be questioned. The third year leave from two to three laterals properly distributed on each of the main stems, but they in turn should be cut back at least one-half. The third year's cutting need not be so severe, but the thinning and shortening in of the fruit bearing branches should be carefully followed out. It is safe to assume that the trees in the fourth year have reached an age when they should bring ample returns, still pruning should be carefully followed out each season. Failure to prune severely when the trees are young means that there will be a lot of long spindling branches with practically all the new growth at the tip ends. A heavy crop may be harvested the third year, but

the branches will bend down under their heavy load, become sunburned and even break off in some cases, thus sacrificing a tree to the rapacity of a grower who in his eagerness to harvest a crop has killed the "goose that lays the golden egg." The many advantages of this method of pruning are: (1) It makes a low heading and a more stocky tree, affording an umbrageous head, and thus protecting it from the hot rays of the scorching summer sun; (2) it enhances the carrying capacity of the tree, thus avoiding artificial props when maturing a crop of fruit; (3) it expedites the harvesting of the crop by rendering it more accessible to the pickers, thus economizing time and expense; (4) it prolongs the life of the tree by reason of conserving its vital forces and rendering it less liable to damage in the breaking of limbs and taxing its strength by carrying its fruits "close in."

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SAN FRANCISCO

## Restoring Old Orchards in California

By Charles H. Shinn, North Fork, California

NEARLY everything which is written about California describes districts whose climate and resources are similar to those of Southern France and Italy. This article, however, has to do with the problems of living in the Californian Sierras, at an elevation of three thousand feet above the sea, and close to snow peaks. More specifically it deals with the restoring of an old orchard. The soil is granite; the slopes are steep and brush covered. It is far from all but the local market. Many fruits are out of the question, for some snow falls every winter, and frosts are both late and early.

People came into this region long ago, when there was much placer mining along the foothill creeks; they took up land claims, built cabins and often planted small orchards. In many cases they moved away when the mines gave out. So it happens that we have at the present time in a land of very attractive mountains and foothills lying east of such prosperous towns as Fresno, Madera and Merced some hundreds of practically abandoned old farms waiting for men with knowledge, energy and a little capital to pick up and put into shape again. The particular "abandoned orchard" of which I write was on a farm of a hundred and sixty acres, which, with the build-

ings, fences and a good deal of clearing, was bought for three hundred dollars. One of the assets was the "the orchard," once a very good one, but now overgrown, broken down and seemingly worthless. "Root it out at once," said the neighbors. Three old pear trees, several plum trees, half a dozen peach trees and some sixty apple trees. That was the total, and they looked about hopeless, even to an old nurseryman.

The pear trees were badly blighted. They were Bartlett's, and that fine variety has "gone back" on the growers in many parts of California. I made a solution of sulphuric acid, one part acid to ten of water, and dipped my pruning tools in it. Then I went all over the trees and cut out all the blight and "die-back," pruning with extreme care and very closely. Then I took a cloth and treated every cut with the solution of acid. Then I burned all the prunings. That was eight years ago, and the pears have borne large crops every year since without a sign of blight. The peach trees were large, had not been pruned for years and seemed worthless. No side branches, no limbs or sprouts near the ground and the tops half dead. The only thing to do in this case was to cut them off waist high and trust

to the outstarting of dormant branch buds. Reduced to stubs like these, the judicious neighbors remarked that it would have been easier to dig them up at once. Of course, all the cuts were painted. The trees lived up to what was expected of them, made new heads and in a couple of years began to bear in good style. The plum trees only needed a drastic pruning to take a new start. The late spring frosts generally catch the Japanese plums. The prunes get through in safety. The apple trees were the main problem of the orchard. They were old-fashioned sorts, mainly Kentucky Red Streaks, Winesaps and the larger crabs. Large areas of the tops were dead; some trees were badly gophered; many had holes or rotten places in their trunks. Some showed "die-back" and blight. All were broken down by cattle. They were large old trees, and still continued to yield some fruit. It took many long hours of hard work to put the apple trees in shape. The long tops were headed back by cutting off from one-half to three-fourths in length. They were thoroughly thinned out and opened up to light and air. Dead wood was taken out and the diseased spots doctored. Each tree formed a separate problem, and in each case a plan of pruning was thought out which would give it a new and accessible head of bearing wood in a few years. As a fact, however, the old apple orchard yielded quite a crop the very next season, and has continued to do better each year since.

There are thousands of old, neglected apple and pear trees in all parts of the United States. I never see one that I do not wish that I could get hold of it and restore its usefulness. As

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Five-gallon cans, per gallon	1.35
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Testimonials sent on application

## Crest Chemical Co.

84 BELL STREET

SEATTLE, U. S. A.



long as the roots are healthy an old tree can be restored and made to form a new top. I have no doubt that the asset of "the old orchard" is more often neglected when people buy farms than any other single item. Every old tree needs to be thoroughly cultivated and to have plenty of fertilizer applied. It may need root pruning, too, so as to induce the growth of new roots. In the case of my own orchard root pruning was not necessary because the granite soil was so open that the roots had gone deeply down, not spreading out on the surface. But in many cases the neglected roots need pruning as much as the neglected tops do. In that case plenty of moisture and the enriching of the soil are necessary, so that the new young roots can have a better chance to start. "Keep a balance between the roots and the top," was the advice of the ancient nurseryman of my boyhood's home valley. The roots' growth is limited strictly by the roots of the other orchard trees, by the nature of the soil and by the crop. Head in the top, open it out all you like, but feed the roots if you want a big heavy bearing tree.

Each year the pruning of this old orchard and the care of younger trees planted since becomes a greater pleasure, for one remembers a thousand little details about each tree and learns to prune accordingly. As each tree has a somewhat different slope, and receives air, light and moisture in different degrees, it appears to develop idiosyncrasies all its own. It is no longer merely a common every-day Kentucky Red Streak, but "that particular old tree with the reddest apples" whose trunk has to be shaded from the afternoon sun with a piece of board, because my drastic surgery of eight years ago dug out a piece of dead wood four inches wide and four feet long over the scar of which the new wood is still growing toward a complete recovery. That White Winter Pearmain is not like the rest of them; its condition in the days that were compelled me to bore holes through its limbs in several directions, draw them together with a pulley, set the nuts on washers and screw them in tightly. The bark has covered them now; the tree is safe and sound again, having healed up the splits and breaks which went nearly down to the ground. And isn't all this a better way than to dig out such interesting old trees which belong to the pioneer period?

I knew a California apple tree once whose history was like this: It was grafted from a tree which went from Illinois to pioneer Oregon planted in the dirt-filled box of a farm wagon and watered all the way across the plains. It was grown in the first Oregon nursery. It was bought when one year old for five dollars, carried on a pack mule some three hundred miles and planted in 1853 on a "flat" by Trinity River, near the mining village of Douglass. The first apples it bore sold for half a dollar apiece. In 1876,

when I saw it, the great tree—a Rhode Island Greening—was bearing a crop of about half a ton of very large apples. Afterward a miner wanted to sluice off this flat, so he paid fifty dollars for the old tree and swept it out of existence—a fifty-year-old and famous pioneer apple tree.

There are stray flakes of gold in the black sand along the creeks by our orchard, but the largest "placers" on earth would not persuade us to sell one of our old, but rejuvenated apple

trees. We restored them, gave them a new lease of life and made the hillside orchard a thing of beauty and use. We hope that for a hundred years to come, and more, those old crabs and Winesaps, and all the rest of them will continue to flourish here.

#### Editor Better Fruit:

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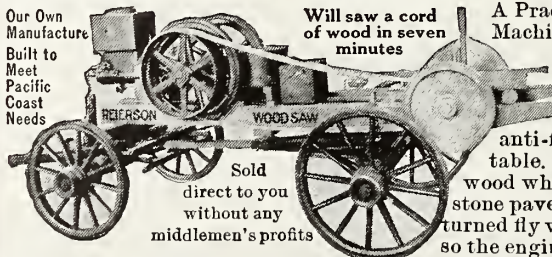
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Butler Banking Company, Hood River, Oregon  
"Better Fruit," Hood River, Oregon

**F. McKERCHER, Owner**  
240 Stark Street, PORTLAND, OREGON

## Department of Publicity of Governors' Special

By P. H. Doyle

**T**HOROUGHLY aroused at last, through the immigration reports of the Canadian government showing conclusively that the tide of immigration that formerly helped to populate and build up our American West has been diverted and is flowing to the Canadian West in ever increasing numbers, the states of the American Northwest have at last decided upon concerted action looking toward checking this startling exodus from the Eastern States to the Dominion. With this end in view practically every Western and Northwestern State is participating, on a larger or smaller scale, in the many land shows that are being held in the East at this time. Through the medium of the excellent exhibits of the states' resources, as ocular substantiation of the claims set forth in the literature and statistics distributed at these shows, the individual states hope to prove to the people of the East that the opportunities presented to them in their own West are greater than those offered to the homeseekers who move to Canada.

Immigration statistics show that the United States is losing its population at the rate of 200,000 persons each year, this being the number of homeseekers who are drawn from the crowded centers of population in the Eastern United States to Western

Canada by the glittering promises of marvelous harvests on cheap lands offered by the Canadian immigration agents. This is the state of affairs which has led to the holding of the numerous land shows. As a fitting climax to the advertising campaign inaugurated by the West, the Northwestern States and Colorado and California have united in what is said to be the most unique method of advertising their resources that has ever been conceived. The plan is the sending of a special train, bearing comprehensive exhibits of each state participating, on a tour of the principal cities of the East, at each of which stops will be made for the purpose of displaying the exhibits and telling of the progress of the West both from an agricultural and industrial standpoint.

While this method of displaying the resources of the West is in itself new, the unique feature of the tour will be the fact that the governors of the various states will accompany the exhibits as the official representatives of the states. It is said that the present is the first time in the history of the United States that a congress of chief executives have banded for any similar purpose. The remarkable finesse of the movement from a publicity standpoint is seen in the presence of the governors, for while the visit of an

exhibit train to any particular city would create a certain amount of interest in the inhabitants thereof, the fact that such a coterie of celebrities lend their presence to the project adds a distinction that would not otherwise obtain, and assures for the tour the greatest possible amount of publicity. The fact that the gubernatorial party will be joined from time to time by the governors of the states in which the special train happens to be journeying at the moment, senators, congressmen, correspondents of various newspapers and others adds to the value of the plan from a publicity standpoint.

After visiting twenty-one Eastern cities, the special will return to St. Paul, Minnesota, with its party augmented by the addition of the senators and members of congress of the various Northwestern States, where a conference, lasting three days, will be held to devise uniformity of action by the Northwestern States and their

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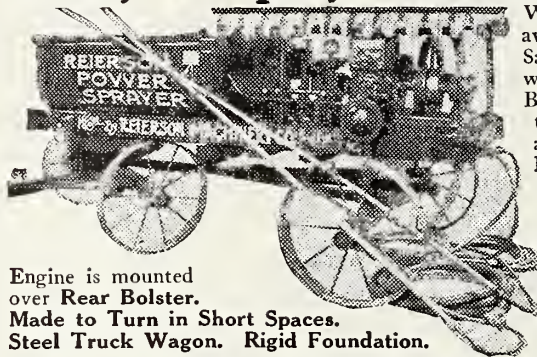
We want to tell you more about this. We want you to read our literature. You will find it interesting and instructive. Mailed free.

**California Spray-Chemical Company, Watsonville, California**



immigration departments in the matter of offsetting Canadian emigration. That the United States government itself is cognizant of the efforts being made in this matter and desires to assist, seems assured from the fact that no less a personage than President Taft has added his semi-official indorsement to the tour of the governors by formally inviting the party to visit him while en tour. With the sole exception of Governor Hiram W. Johnson of California, who, it is said, has called a special session of the legislature which will be in session at the time of the tour, each one of the chief executives of the ten states participating will be on the special when it leaves St. Paul on the evening of November 27, on its memorable tour. Whether the hopes of its promoters and the good wishes of the Western people will bear fruit must be left to the near future, when a comparison of the immigration statistics will show whether the vast number of home-seekers will have been persuaded to develop their own country or an alien one.

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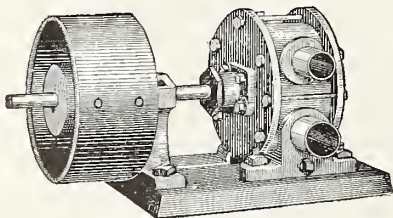
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### Frost Fighting Studies in the Rogue River Valley

By C. I. Lewis and F. R. Brown, Oregon Agricultural College Experiment Station, Corvallis

(Continued from last issue)

A Test with 100 Troutman Heaters Per Acre, April 20.—A test was made in this block April 20 with 100 heaters per acre, or a total of 195 heaters. The outside temperature at 4 o'clock was 29 degrees. A light drift of about two miles per hour came from the south. The heaters were lighted at 4 o'clock, and beginning at 4:15 readings were taken every fifteen minutes, with six thermometers on the inside of the heated area and three on the outside. The outside thermometers were placed 200 feet from the edge of the heated area. This block of trees was such that it was possible to arrange the heaters in a square 294 feet each way, and having a strip on the south and one on the north which were not heated. At 4:45 the drift almost entirely ceased and a very dense smudge formed. At this time the outside temperature also rose slightly. Observations were taken May 10, and it was noticed that the farther the trees were from the heated area the more damage was done by frost. At 5 o'clock a cold drift set in from the southeast, varying from southeast, south to southwest. The sun rose at 5:40. At a few minutes past 6 smudge from the Bear Creek Orchards, which were located about three-quarters of a mile to the southeast, reached the plot, but just before it reached the orchard the temperature of the outside thermometer dropped one degree and remained there until the smudge had reached us, when it again rose to its former position. This was seemingly due to a bank of cold air which immediately preceded the smudge. The following chart will give the temperatures maintained during that period:

Inside	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00
Temp...	32	33	33	32	32	31	31.5	32
Temp...	34	34	34	35	34	32	31	32
Temp...	34	35	34	32	33	32	32	33
Temp...	34	35	34	34	34	33	33	33
Temp...	35	34	34	34	32	33	34	32
Temp...	32	33	33	32	31	32	32	31
Average.	33.5	34	33.7	33.2	32.7	32.2	32.2	32.2
Outside								
Temp...	29	29	30	29	28	28	28.5	29
Temp...	29	29	29	29	28	28	28	29
Temp...	29.5	29.5	30	29	28.5	29	29	30
Average.	29.1	29.1	29.6	29	28.2	28.3	28.5	29.3
Increase.	4.4	4.9	4.1	4.2	4.5	3.9	3.7	2.9

Highest increase, 4.9; lowest increase, 2.9; average increase, 4.1.

Maximum Burning Time of the Troutman Heaters Filled to the Capacity, Which Is Five Quarts of Oil.—The oil used for this burning was a 20-degree "slop" distillate. Three hundred and three heaters were lighted at 2 a. m. The outside temperature at this time was 34 degrees. The arrangement of heaters in the plot was 21x31 feet. During this night there was no danger of frost, but as the season was getting late and no maximum test had been carried out for this heater, it was thought best to carry it out regardless of the temperatures. It was noticed that the coldest time of this morning occurred shortly after 2 a. m. The following chart will show the temperatures maintained during the burning period with 100 heaters per acre:

Inside	2:30	3:00	4:00	5:00
Temperature .....	36	49	48	48
Temperature .....	36	48.5	47	46
Temperature .....	36	48.5	47	47
Temperature .....	36	49	47	47
Temperature .....	36	49	48	48
Temperature .....	37	49	48	47
Temperature .....	38	49	48	49
Temperature .....	48	48.5	48	47
Average .....	36.7	48.7	47.6	48.6
Outside				
Temperature .....	34	44	44	44
Temperature .....	34	45	45	44.5
Temperature .....	34	45	44	44
Temperature .....	34	44	44.5	44
Average .....	34	44.5	44.4	44.1
Increase .....	2.1	4.2	3.2	4.5

Highest increase, 4.5; lowest, 2.1; average, 3.6. At 6 a. m. 9 heaters were out; at 6:30 a. m. 34 heaters were out; at 7 a. m. 71 heaters were out; at 7:30 a. m. 190 heaters were out; at 8 a. m. 276 heaters were out; by 8:30 a. m. all had burned out. Average burning time, 5½ hours. Outside temperature had raised to 44 degrees.

After 5 o'clock the outside temperatures had raised so high that it was not thought of value to continue registering temperatures. In all of the pots, after they had gone out, there remained from one to four inches of heavy residue which would not burn, and when cool was very hard. This was partially due to the fact that on two previous occasions the heaters had been extinguished with about one quart of oil left in the bottom and refilled without emptying. Probably each time the lighter oils had burned away and the residue mentioned above was an accumulated residue rather than the product left from one burning. The average increase of tempera-

ture with the heaters arranged 17x25 feet was 3.6 degrees for a period of three hours, and with the same heaters in the same block arranged 21x21 feet an average increase of 4.3 degrees was obtained.

Maximum Burning Time for the Bolton Heaters Without the Carbon Arrester.—One hundred heaters filled to their capacity of one gallon were lighted at 2 a. m. April 26. These had also been rearranged, so they were placed 21x21 feet apart. As there was no danger of frost during the night temperatures were taken once every hour. The following chart will show the temperatures maintained during the burning time:

Inside	2:30	3:00	4:00	5:00
Temperature .....	36	47	48	48
Temperature .....	37	49	48	48.5
Temperature .....	36	47	47	48
Average .....	36.2	47.5	47.5	48.1
Outside				
Temperature .....	34	44	44	44
Temperature .....	34	44	45	44.5
Temperature .....	34	45	44	44
Average .....	34.1	44.5	44.3	44.1
Increase .....	2.1	3	3.2	4

Highest increase, 4 degrees; lowest, 2.1; average, 3.1. Average burning time, 4¼ hours. At 5 a. m. 3 heaters had gone out; at 5:30 a. m. 21 heaters had gone out; at 6 a. m. 46 heaters had gone out; at 6:30 a. m. 91 heaters had gone out; at 7 a. m. 99 heaters had gone out.

#### NOTICE

Owing to the fact that the Eastern Land Shows and Governors' special train will draw a number of our representative fruit growers out of the state during the month of December, the executive board of the Washington State Horticultural Association has postponed the next annual meeting at Clarkston to January 4, 5 and 6, 1912. Will you kindly notify all whom you think may be interested?

L. M. BROWN, Secretary.

Walla Walla, Washington, October 3, 1911.

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This test was carried on at the same time and under the same conditions as the Troutman test. At 6:30, when 91 of the heaters were out, a count was made of those which had burned clean. 82 of the 91 heaters had burned clean, leaving nothing but a heavy coat of soot around the upper part of the sides of the heaters. Of the nine that contained a residue four had only a quarter of an inch in depth, part of which was soot which had been scraped down before. Two contained one inch of heavy residue and the other three not more than two inches of heavy residue. Of these three, two, when relighted, burned clean. The other, however, contained some water and would burn no more.

Maximum Test of the Troutman Heater with a Measured Gallon of "Slop" Distillate.—This was carried on April 26, at the same time of the other two maximum burning time tests. In this block, however, temperatures were taken every fifteen minutes until 5:45. This test was carried on in the block of Red Cheek Pippins with the heaters arranged in the square 21x21 feet. 195 heaters were lighted at 2:35, and the following charts will show the temperatures maintained and the length of burning time:

Inside	3:15	3:30	3:45	4:00	4:20	4:50	5:20	5:45
Temp...	47	47	48	48	48	48	48	48
Temp...	47	48	48	48	48	48	48	48
Temp...	48	48	48	48	48	48	48	48
Temp...	48	48	49	49	49	48	48	48
Temp...	48	48	48	48	48	48	48	48
Temp...	46	46	46	46	46	46	46	46
Average	47.3	47.5	47.8	47.8	47.8	47.7	47.7	47.7
Outside								
Temp...	44	44	44	44	44	44	44	44
Temp...	44	45	44	45	45	44.5	44	44
Temp...	44	44	44	44.5	44.5	44	44	44
Temp...	44	44.3	44	44.5	44.5	44.2	44	44
Average	44	44.3	44	44.5	44.5	44.2	44	44
Increase	3.2	3.8	3.3	3.3	3.5	3.7	3.7	3.7
Highest increase, 3.8 degrees; lowest, 3.2 degrees; average, 3.5 degrees. At 6 a. m. 9 pots were out; at 6:30 a. m. 67 pots were out; at 7 a. m. 156 pots were out; at 7:30 a. m. 166 pots were out; at 8 a. m. 195 pots were out. Average burning time, 4½ hours.								

A Test with the Troutman Heaters with the Covers Inverted, Acting as a Carbon Arrester, April 29.—This test was carried out in a block of Red Cheeks with 193 heaters lighted. The arrangement was the same as in previous tests. The test was made on the morning of April 29. This was the coldest morning throughout the valley which was experienced during the season, the temperature in many places going as low as 22 degrees. However, in the orchard where the test was carried out 26 degrees was the lowest temperature recorded. The heaters were lighted at 3:30 a. m., when the outside temperature was 29 degrees and the mercury falling. The first reading was taken at 4 o'clock, when the outside temperature was 28 degrees. The following chart will show the temperatures maintained from 4 o'clock until 5:30. After 5:30 the temperature outside rose steadily until 6 o'clock, but no reading was taken, as the heaters were put out. Between 5 and 5:30 the inside temperatures began to drop, so that the covers were entirely removed and the heaters allowed to burn free. This was necessary largely because of the large amount of soot which collected on the covers. The

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A. D. CHARLTON  
Assistant General Passenger Agent  
PORTLAND

amount of oil consumed during this burning period of two and one-half hours was 135 gallons and one quart, or an average of 2.8 quarts per heater. A very gentle drift from the south was noticed during this entire test. The temperature during the next day was quite high until about noon, when it became cloudy and a cool breeze began blowing.					
Inside	4:00	4:30	5:00	5:30	
Temperature	31	32	32	30	
Temperature	32	34	32	29.5	
Temperature	31.5	33	31.5	29.5	
Temperature	31	33	32	30	
Temperature	32	34	36	31	
Temperature	30.5	31	31	29	
Average	31.4	32.9	32.4	29.8	
Outside					
Temperature	28	28.5	27	27	
Temperature	27.5	28	26.5	26	

Average ..... 27.7    28.7    26.7    26.5

Average increase..... 3.7    4.2    5.7    3.3

Average for entire period, 4.2 degrees; average with arresters, 4.5 degrees.

The morning of May 6, when a frost had been predicted, a test was made in the Burrell orchard with the Bolton orchard heaters, burning a 14-degree fuel oil. The trees were 24 feet apart and eight or nine years of age. Nine thermometers were used in the heated area and three on the outside. About 2.3 acres of young Bartletts, with 47 heaters per acre, were used. These were lighted at 3:45, with the outside temperature at 32 degrees. Readings were taken every half hour until 5 o'clock, when they were taken every



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fifteen minutes. At 5:45 the temperatures had risen so much on the outside and the sun was shining upon some of the thermometers, so that no attempt was made to take a reading. A few of the heaters burned out within an hour and a half, due to the fact that eight previous firings had been made with no attempt to clean out the residue. In two heaters which were examined fully a half gallon of thick deposit was found, and in many of the other heaters which went out shortly after 6 o'clock almost as much residue was left. A steady wind was blowing from the south at about three miles per hour, making it quite difficult to form a heavy smudge. However, by 4:30 the north half of the block was sheltered by a very dense smudge.

Inside	4:00	4:30	5:00	5:15	5:30
Temperature..	32	34	34	33	33
Temperature..	32	34	33	33	33
Temperature..	32	36	36	34	34
Temperature..	35	34	35	34	34
Temperature..	34	34	35	34	34.5
Temperature..	34	34	34	34	34
Temperature..	34	34	34	34	33.5
Temperature..	34	34	34	34	34
Temperature..	34	33	34	33	33.5
Average .....	33.4	34.1	34.3	33.7	33.7
Outside					
Temperature..	32	32	32	31	32
Temperature..	33	32	32	31	33
Temperature..	33	32	32	31	32.5
Average .....	32.6	32	32	31	32.5
Increase .....	.8	2.1	2.3	2.7	2.2

Average increase, 2.02 degrees.

The results of the work this season are very gratifying, for after one of the most trying seasons in the history of the valley there still remains a fair crop of fruit. In the orchards where the test was carried out a good crop was saved in the apples and pears, and

with the exception of the d'Anjou no injury occurred. The d'Anjou pears were located between the other varieties, and a portion of each variety was used in each block. There was also a strip across the end of each variety which was not in the heated area. There was considerable ringing and russeting in the d'Anjou, but practically none on the other varieties. This injury occurred both where the heaters were used and where they were not, and from all indications it would seem that it was the effect of a late frost, and occurred on a night when no heating was done. The fact that the d'Anjou were the only ones injured would indicate that under the conditions experienced this season the d'Anjou are more susceptible to frost injury than the other varieties. This also indicates that the danger point for frost injury has not as yet been definitely worked out.

Observations Taken in the Different Orchards Throughout the Valley and Experiences of Some of the Growers with Wood Fires.—Mr. Allen, of the Hollywood orchard, during the past three years has practiced smudging, but previous to this year, 1911, has used nothing but manure smudges. In 1909-1910 he saved his entire crop without using wood. In 1911, when the cold period of April 12 and 13 came, he decided that the temperature would be too low to be safe with only manure smudges, as the ground was very cold. He then placed wood in



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his orchard at 60 feet apart where the trees were 30 feet apart. On his fifty acres he used nine cords of wood to make the first fires. The first three nights he had used approximately five cords of wood. His trees being small, he found that he was unable to save the entire crop in that way. In fact around the outer edge and across one end of his orchard the fruit was almost entirely killed, and throughout the entire block a great many blossoms were injured. However, on a large per cent of the heated area enough fruit was saved to make a fair crop. The lowest temperature which he noticed inside the heated area was 26 degrees. On the morning of April 13, at 4:30 o'clock the temperature reached 29 degrees, and at 5 o'clock had reached

27 degrees. On the morning of April 14, at 2:15, the temperature had reached 26 degrees, and on the morning of April 15, at 5 o'clock, the temperature reached 26 degrees. Mr. Allen uses a Cederborg alarm, which he finds to be reliable. The arrangement of the alarm he has changed somewhat from the original plan. He uses two sets of batteries, one for the current through the thermometer and the other for the bell. He has two points on his thermometer, one at 33 degrees, which rings first, at which time he notes the hour and returns to bed. The second point is at 31 degrees, and when the temperature reaches this point and rings the alarm he notes the time required for the temperature to drop the two degrees and estimates at that rate how long it will be before the danger period is reached and before it will be necessary to fire. The advantages and disadvantages of the Cederborg alarm will be taken up in another place, so nothing more need be said here. Mr. Allen found it necessary to use fifteen to eighteen men in handling wood fires on fifty acres. His wood cost him \$6.25 per cord, but could have been obtained at \$5.25 earlier in the season. He practices firing when the temperature reaches 30 degrees.

The Midvale Orchard.—This orchard consists principally of young trees. However, there was a block of about an acre and a half of eighteen-year-old trees—Bartletts and Winter Nelis. Mr. Norris places his fires 50 feet apart

and alternates them so he gets a very even distribution of the fires throughout his block. He had in this block thirty fires, using old rails and a pile of manure for each fire, which he added late in the morning, just before the sun rose, to obtain a smudge. He states that while having only thirty fires to look after he found that it was too much work for one man to do and be sure of saving his crop. On the morning of April 14, when the temperature dropped to 26 degrees, he was unable to keep his fires going well enough to be sure he was saving his entire crop. However, enough of his bloom remained so that he will have a good crop of pears, with the exception of a few Comice and Bartletts on the outer edge.

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The Buckeye Orchard.—The Hous-ton Brothers, of the Buckeye Orchard, were successful in saving their crop of Bartletts of about three acres, where during the previous seasons no frosts were experienced. The danger during the present season, however, was so evident that they made preparations to protect their crop. Their orchard is in a long, narrow strip, and very difficult to heat. However, with the

fires 40 feet apart where the trees are 24 feet apart they were able to protect the fruit entirely. The coldest temperature which they noted during the season was 26 degrees, occurring on the morning of April 15. The cost of firing was as follows: Distributing material, two men and a team one day, \$7; one man on duty lighting, \$2.50; two extra men to light fires, two and one-half hours, \$2. The fence rails and manure which were used cost nothing. Figuring three acres in the block, the cost of the first firing averaged \$3.83 per acre. The second firing was less, due to the fact that most of the material used in the second firing was left from the material placed for the first firing. It required one man one-half day to pile the material, so that the cost of firing the second time averaged \$2.33 per acre, not counting the cost of fuel. A third firing, however, would have been as expensive as the first firing.

Mr. Workman's Orchard.—In this orchard four rows of Howells were

severely injured, due to the fact that they were long rows and difficult to heat. An attempt was made to protect them with two rows of wood fires 60 feet apart. In a four-acre block of Bartletts 30 feet apart, trees about twelve years of age, about 50 per cent of the bloom was damaged, but enough was saved to insure a good crop. Old rails were used in this orchard, the fires being placed 30x60 feet apart. After each firing it required two men and a team almost a day to prepare for the next firing. The lowest temperature noticed in this orchard was 25 degrees on April 15.

J. G. Gore's Orchard.—Old rails were used in this orchard, being placed 40x60 feet apart. Crude oil was used to assist in firing, as the rails were

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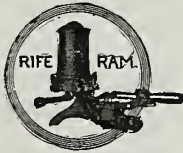
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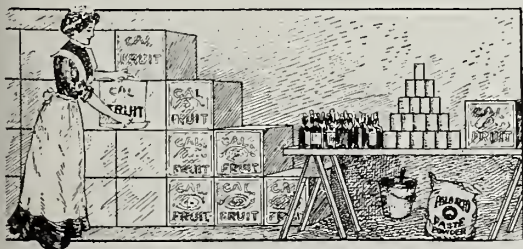
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damp. There were eight acres in this block, and no damage was noticed. Apples adjoining were damaged about 20 per cent. In the center of the block of apples little or no damage was noticed. Mr. Gore found it very difficult to obtain a satisfactory temperature during the first two nights of firing, principally because just previously considerable rain had fallen, causing the rails to burn very slowly.

Mr. Phipps' Orchard.—This orchard was equipped with coal heaters, but wood fires were used to assist in smudging. The coal used in the heaters was obtained about a mile and a half from the ranch and cost \$5 per ton at the mine. The grade of coal was only fair, but proved quite satisfactory for short burning periods. Mr.

Phipps states that he would use 100 heaters to the acre, but only fired 50 at a time. In using the 100 heaters he would then be prepared to fire for seven or eight hours in succession. Twenty to twenty-five pounds of coal were used in each heater. The method of lighting is to place a small amount of kindling in the bottom of the heater with a piece of oil-soaked waste sticking out through the bottom. This waste ignites very easily and soon fires the coal. Mr. Phipps figures the cost of firing with coal heaters to be about five dollars per acre for each firing, twenty pounds of coal being estimated to burn about three hours. He also states that he has good success with wood fires, but would use nothing but a good grade of fir cordwood for that purpose, and if such were used the cost of firing would be approximately ten dollars per acre for one night's burning from five to six hours. Mr. Phipps states that in no case would he prepare less than 100 fires per acre, using 50 at first, having as many more to fall back on in case he was unable to hold the temperature.

Palmer Orchard.—This consists of young trees five, six and seven years of age, and gave promise of producing a very heavy crop of pears this year. Mr. Palmer protected the crop one night, but the second night, between 5 and 6 a. m. April 15, the temperature dropped to 25 degrees and damaged his crop so severely that he made no further effort to protect it. On this morning the temperature at 5 o'clock inside the heated area was 29 degrees and on the outside 26 degrees. Between 5 and 6 o'clock the temperature dropped both inside and outside of the heated area to 25 degrees, and while he had a double number of heaters in his orchard it was too late to save his crop after the drop was noticed. He placed about 150 heaters per acre, and at the time of the damage 75 per acre were burning. At this time in a small block of peaches a great percentage of them were killed. In an orchard adjoining Mr. Palmer's the man saved the fruit on seven isolated trees by burning from five to seven fires around each tree. For this purpose he used wood.

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THREE RIVERS, MICHIGAN

The Merritt Orchard.—This consists of four acres of Spitzenberg and Newtown apples. Eighty heaters per acre were placed in this block. The early frosts which threatened to damage the pears did no injury to this orchard, and the first firing was done April 25. Four firings were made—April 25, 26, 29 and May 5. The trees are 24 feet apart, very large and almost meet between rows. The coldest temperature occurred April 29, when 24

degrees was registered. Part of the orchard was supplied with a double row of heaters for reinforcement in case of a long firing time.

A. C. Fiero Orchard.—One block of old trees 20 feet apart, consisting of about three acres, were protected, using about 110 heaters per acre. However, only 50 per cent were lighted at first, and when they had burned out the remainder were fired. In this way the firing period was doubled. In this block practically no damage was done. In a block of young trees just across the road, where the trees were 35 feet apart and only one pot to the tree was used, about 50 per cent of the fruit was damaged, and on one or two small trees the entire crop was killed, the coldest temperature occurring April 29, and the thermometer registering 23 degrees. The cost, not counting refilling, was \$3.50 per acre for one firing, where one gallon of oil was used. It required two men and a team one day to fill a thousand heaters. A total of ten firings was necessary in this orchard. Both the "slop" distillate and the crude oil were used, and no difference was noticed in the temperature maintained by the two. The burning time, however, with the crude oil was slightly longer for the first firing, but shortened with each successive firing, due to the fact that each time a considerable amount of heavy residue was left in the pots. It was noticed in the young orchard, where 35 heaters per acre were used, that it was impossible to hold the temperature above the outside temperature, so practically all the advantage gained in smudging was a heavy bank of smoke, which remained in the orchard till late in the morning.

The Foothills Orchard.—This forty-acre orchard contains Winter Nelis, d'Anjou and Bartlett pears. It lies with a slight slope to the southeast, there being usually a fairly good air drainage from the northwest to the southeast. Seventy-one Bolton or Fresno heaters were used per acre, half of which were lighted at a time. With an outside temperature of 26 degrees they were able to maintain a temperature of 30 degrees within the heated area, and in some places the temperatures ranged from 31 to 33 degrees. However, when the outside temperature dropped to 25 degrees they were unable to keep the inside temperature above 29 degrees. Ten thermometers were used in this block. Most of them were of the cheaper grade, but all were tested and compared with a standard Taylor thermometer. Fuel oil testing 15½ degrees was used in this orchard. This cost \$3.77 per 100 gallons at their siding, which was about two miles from the orchard. There was no trouble whatever in this orchard with the pots boiling over. This is largely due to the fact that the oil was taken from the bottom of the tank, and each time the water was allowed to drain off before the oil was taken out. Fuel was distributed to the heaters by means of a galvanized iron tank, mounted on a wagon. The usual trouble with a heavy residue forming in the bottom of the heaters was noticed in this orchard. However, Mr. Carpenter thinks he has a means of overcoming this difficulty. A small knife with a tin box attachment is run around the pot, collecting this residue immediately after the pots are extinguished. This means a waste of considerable material during the season. The practice of emptying this heavy residue onto the soil is questionable. Mr. Carpenter practiced keeping his

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fires going until 7:30 a. m. This was from an hour to an hour and a half longer than in most of the other orchards. This orchard was one of three where a single frosted flower could not be found inside the heated area. An extra row of heaters was used on the outside for reinforcement and were placed about fifteen to twenty feet from the first row of trees. All of the varieties were setting a heavy crop except the Winter Nelis. These were planted in alternate rows with the Bartletts, and with the exception of a few trees on the northeast corner, where the soil is considerably lighter and the bloom earlier no pears were setting. Of those few trees which were noticed to bloom earlier a fair crop had set. Four men and a team were required to fill two thousand heaters in a half day. Mr. Carpenter states that if crude oil is used it requires one more day to unload the car on the siding than if the distillates are used, as the latter will run much more freely and can be handled faster. In this orchard it was noticed that the heaters having once been burned had to be refilled before they could be relighted. The coldest temperature occurred April 29, when the thermometer reached 25 degrees for a short time. Nine firings were necessary during the season.

Eden Valley or Burrell Orchard.—This orchard consists of a block of Winter Nelis, Bartlett, Howell and Bose, and comprises about forty-two acres. With the exception of about three acres of young Bartletts this is in a solid block, the trees about 18 years of age and 24 feet apart. Sixty-five heaters per acre were used, burning a fuel oil testing 14 degrees. Five cheap thermometers which had been tested the year before were used in this block. The pears were not injured on the inside of the heated area of the large block. On the east and south the outer row was slightly damaged, and in the block of young Bartletts some damage was noticed. However, there will be a good crop on the entire tract, with the exception of the Winter Nelis, which did not set well. Only a few of the smaller trees in the Winter Nelis block had more than a very light set. One row of heaters was used outside of the orchard for reinforcement, but was set only about eight feet from the outside row, so was not effective. Next year

Mr. Roth plans on adding an extra row twenty feet from the outside row of trees. Fourteen to sixteen men are used to light the heaters. Refilling the heaters is the greatest expense in heating this orchard. A storage tank for the crude oil, with a capacity of 10,000 gallons, is used. The lowest outside temperature noted during the season was 24 degrees. This occurred April 29. At the same time the lowest inside temperature was 29 degrees. The Bol-

ton or Fresno heater was used in all eleven firings which were made in this orchard during the season.

The Snowy Butte Orchard.—In this orchard, which consists of Winter Nelis pears planted in a solid block, 140 heaters per acre were used. Two were placed in the center of each square of trees, which were 24 feet apart. Only half of the pots were lighted at a time, the remaining half being held in reserve in case the cold spell extended over a long period. No frost injury was noticed in this orchard, but the pears were setting very lightly. A few trees on the outside of the heated area were examined and showed the effect of frost very badly.

Bear Creek Orchard.—The Bear Creek Orchard was divided into three different blocks. In the first, consisting of young Comice and Bartlett, the trees are 24 feet apart, and a heater was placed for each tree, making about 70 heaters per acre. Only half were lighted when the temperature reached 30 degrees, and as long as the inside


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temperature remained above that no more were lighted. This number of heaters proved enough protection in that block during this season, and on May 12, when an examination was made, the pears were in good condition and a heavy crop had set, with only a few showing any frost injury. The second block consisted of old Bartlett trees, which were large enough to almost meet between the rows, forming a very good screen for holding the heat. It was noticed that a much higher temperature could be maintained with 35 heaters per acre than in the other plot, and that at any time 70 heaters per acre would be ample protection in a block of this kind. No injury from frost was noticed, and even a few Comice trees 50 to 150 feet away from the heated area showed only a slight injury from frost. In the third block, which is known as block 12, the trees are younger, somewhat smaller and placed thirty feet apart. Sixty heaters per acre were used. In this block considerable difficulty was experienced in maintaining a satisfactory temperature, and some damage occurred. However, enough of the crop was saved to insure a fair yield, with perhaps only a small percentage of the fruit seared with frost injury. It is the plan of the foreman of this orchard to double the number of heaters in this block next year in order to be able to absolutely protect the crop in this block from all injury. Mr. Brooke uses a Cederborg alarm. In conjunction with the local branch of the weather bureau this makes a very satisfactory combination. Mr. Brooke states that he has been very well pleased with the Cederborg alarm, and is planning to install an alarm for each block, fitting up his packing house for sleeping quarters during the frost season. In this way he will be able to know in what place the danger is and at once be ready to protect that block. He has tried the Cederborg thermometers and found them very satisfactory, and is planning on using more. He also expects to keep an accurate record

both of the inside and outside temperature on the nights when it is necessary to fire. The fuel used in this orchard was 14 degrees fuel oil and 20-degree "slop" distillate. He finds that there is very little difference between the two so far as the production of heat and smudge is concerned. The crude oil has a slightly longer burning time.

Orchards Near Eagle Point.—There were two separate blocks in this vicinity, both of old trees twenty feet apart, so large that they met in the center of the row. In the large block of Spitzenbergs there was a heavy bloom, but all of the blossoms examined on a number of trees throughout the orchard were either killed or severely injured by frost. In a small tract of about three acres near the creek a great deal of damage was found. However, a few of the tops of the trees in this block will probably have a fair set of apples. Near the creek the damage seemed to be less than at the opposite end of the orchard. No attempt was made to protect this orchard, since there was no record of previous frost injury in the orchard. On the morning of April 29 a temperature of 22 degrees was noticed. A few pear trees near the house apparently escaped with only partial injury. These were also near the creek, and all showed considerable damage, but will have enough pears left to make a fair crop.

The Problem of the Failure of the Winter Nelis Pears to Set.—After the frost season was apparently over and the growing season fairly well started, a great deal of comment was heard from all sides in regard to the setting



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of Winter Nelis pears. At first this comment came principally from those orchardists who had used oil for smudging, and at first was attributed to the fact that the oil deposited from the soot on the blossoms had prevented the insects from working and effecting pollination. As the season advanced and this complaint became more general an investigation was carried on in most of the orchards of the valley to ascertain if possible some reason for the non-setting of the Winter Nelis pears. First working upon the basis that the failure was due to the cold, cloudy weather which prevailed during the blooming period and not to the effect of smudging, the investigation was begun in those orchards where heating with oil was practiced. A comparison of the results in these orchard and those orchards which were heated with wood fires was made. The first important fact in relation to this problem concerns itself with the blooming period of the different varieties. As has been stated elsewhere in this bulletin, the excessive warm weather between March 27 and April 5 had forced the Bartlett, Howell, d'Anjou and Comice pears into full bloom. At the same time the Bosc and Winter Nelis were developing, and in fact the Bosc were very nearly as far along as the early varieties. However, the cold period beginning about April 5 seemed to check the bloom on the Winter Nelis so that the buds opened very slowly and they did not come into full bloom until about April 15, and later. This was just at the time of the two heavy smudgings and gave rise to the idea that the lack of pol-

lenation was due to smudging. It was noticed in the Marshall orchard that the Monday following the smudging on Saturday that the blossoms were not coated with soot. A heavy wind on Sunday had blown the petals from the Bartletts and d'Anjous to a considerable extent. On examining the Winter Nelis it was found that very little soot had collected on the open flowers, due to the fact that a large percentage of the buds had only been partially opened previous to Saturday morning, but that the larger percentage had entirely opened on Sunday and Mon-

day. Thus the flowers and pollen of these buds were protected from any deposit of soot. Later an examination of this block showed that much of the fruit which was setting on the Winter Nelis trees in this orchard was around the lower part of the trees on the lower branches, where in all cases the heaviest deposit of soot was noticed. In the Foothills Orchards of Mr. Carpenter, where the Winter Nelis were alternated with Bartletts, the same lack of setting was noticed, with the exception of a few trees in one corner of the orchard where they bloomed slightly



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earlier. These few trees set quite a full crop. In the Gore orchard, and in the Workman orchard adjoining, where wood fires were used, the same results were noticed with the Winter Nelis pears. In the Midvale Orchard, which consisted of a few rows of Winter Nelis and about the same number of Bartletts, it was noticed that some of the Winter Nelis trees near the Bartletts were setting a full crop, but others in the same row did not, and practically all of the second row from the Bartletts were setting very poorly. In some instances a single branch on a tree would be heavily laden, with only

a few on the remainder of the tree. In this orchard the Bartletts were in full bloom when the cold weather came on, or about April 5, and the Winter Nelis had been held back for at least ten days. Apples adjoining the pear orchard were entirely killed on the morning of April 29, as no attempt was made to smudge. The pears were all saved by the wood fires used. In two small blocks which were heated with wood fires entirely very few Winter Nelis pears were found to be setting fruit. In the Snowy Butte Orchard, which consists of about fifteen acres of Winter Nelis pears in

a solid block, only a few scattering trees have set a crop. A very peculiar thing was noticed in this orchard—occasionally two-thirds of a tree would be heavily loaded, while all around there was no fruit. Furthermore, a great many trees had one, two and three limbs which bore heavy crops, while the rest of the tree had but a few.

Having investigated the principal orchards which were heated or smudged with oil, wood or manure, the next step was to hunt up an orchard which had not been heated or smudged, and where it was known that the soot could not have done the

injury. Such an orchard was found along the side hill between Jacksonville and Central Point. This orchard belonged to Mr. Griffis, and the same condition prevailed here and in two adjoining orchards as had been found in the orchards which had been heated. In an orchard owned by the York Real Estate Company, which has a large number of varieties, it was noticed that all of the pears were setting and free from injury by frost, except the Winter Nelis. This orchard is located on the steep hillside, extending a short distance on top of the hill. Two small trees on top of the hill were setting a heavy crop. Very small Winter Nelis trees were also setting a fair crop. The large trees in this orchard were setting only a few scattering fruits. These were near some of the small trees mentioned, and in each case surrounded by other varieties which were bearing heavily. In an orchard at the foot of this hill which was not heated four rows of Winter Nelis pears were planted, alternating with one row of Comice. No effect due to pollination was noticed between the two. There was one very small tree which was setting a full crop. After going over a large number of orchards and finding that under all conditions, whether heated or not, the Winter Nelis pears showed similar peculiarities in setting, it would appear as though this condition was due to the kind of weather which prevailed during the blooming period. The investigations carried on this year were not conclusive, and simply opened up a problem of some magnitude for future solution.

Conditions in the Willamette Valley.—Through the courtesy of Mr. Powers of

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¶ Each month it publishes from five or six short stories by such authors as Jack London, Stewart Edward White, Harvey Wickham, D. E. Dermody, Seumas MacManus, Fred. R. Bechdolt, and other well known writers of short stories. Its stories are clean, wholesome and readable.

¶ Each month one or more strong articles are published by such writers as William Winter, the dean of dramatic critics, John Kenneth Turner, the author of "Barbarous Mexico", Rabbi Wise, the noted Jewish Rabbi, and John E. Lathrop, who contributes a non-partisan review of national affairs. Charles Erskine Scott Wood contributes each month under the title of "Impressions" a brilliant record of personal opinion.

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the agronomy department of this institution we are enabled to present a summary of the temperatures at Corvallis during the season of frosts. As in Southern Oregon, during the latter part of March the weather was extremely warm; in fact the month of March averaged about three and one-half degrees above normal. This had a tendency to force the buds into full bloom. The warm period was followed by a succession of cool days and frosty nights. The following temperatures for April are given:

Date	Minimum Temp.	*Dew-point	Time Temperature remained below danger point
April 2....	29	38	4:30 to 6:30 a. m.
April 6....	28	34	5:00 to 6:00 a. m.
April 11....	31	34	4:00 to 7:00 a. m.
April 12....	29	..	3:30 to 6:30 a. m.
April 13....	25	32	5:00 to 6:00 a. m.
April 14....	27	33	4:30 to 6:30 a. m.
April 15....	30	39	5:30 to 6:00 a. m.

\*Dewpoint night before taken between 6 and

On April 17 and 29 the temperature reached 31 degrees for a short time only. During the time of the most severe frost, and especially April 13, when the temperature reached 25 degrees, most of the fruit was in full bloom, especially the cherries, peaches, prunes and pears. Apples were hardly far enough out to be seriously injured.

By comparing these temperatures with the tables of temperatures reputed to be injurious one would expect a very light fruit crop in the Willamette Valley. However, such is not the case, for there was a good set of apples and pears. Cherries were slightly injured, some of them probably 50 per cent. Peaches were hurt more than any of the other fruits, in some places as much as 60 to 75 per cent being injured. In some places prunes were badly hurt and in other places hardly injured. An average of about 40 to 50 per cent injury to this crop would probably be a fair estimate. At Corvallis, where the temperatures were taken, the most serious injury was noticed on some of the earlier varieties of strawberries. With these figures before us it would seem as though an arbitrary table of temperatures for frost injury could not be made, as the humidity of the air and the weather conditions generally seemed to cause a very wide variation in the effect of the frosts. It may be possible in the future to work out figures under certain conditions which would be arbitrary, but that will necessarily be a rather difficult problem. In most of the tables



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which are found in print we find the temperatures at which injury will occur between 27 and 30 degrees. With all kinds of fruits, both in the Rogue River Valley and in the Willamette Valley, it was noticed that these temperatures did not apply, for in many instances peaches passed through a temperature of 27 and 28 degrees without injury. In other cases pears and apples in the bud appeared to be injured at a temperature of 29 degrees. It might be well, however, to state that under normal conditions the general rule seems to be that unless there is a large amount of moisture in the air a temperature of 29 to 30 degrees will be dangerous to most varieties. The peach is generally considered much more susceptible to frost injury than the pear. However, in one orchard where peach fillers were used with pears the pears were about 50 per cent killed, and no injury was found on the peaches, so that further investigation may prove that supposition incorrect.

Summary.—(1) Six and one-half acres of seventeen-year-old pears were used in one block and two acres of apples in another. The apples planted 34½ feet apart were apparently as easy to heat as the pears planted 25 feet apart. (2) The latter part of March was very warm, followed by a very cold April. Only a little rain fell and some snow, but the days were cloudy. The pears were in full bloom by April 10. From April 12 to May 5 six frosts were recorded. The lowest temperatures for each being 29, 27,

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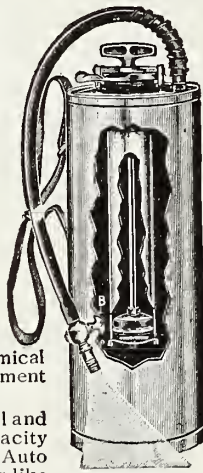
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25½, 28, 26 and 31 degrees, respectively. (3) Two grades of oil were used—28-degrees distillate and 20-degree "slop" distillate. The cost of the latter was \$6.25 per 100 gallons. The heavy fuel oil left an inch of residue for each firing. This would not burn, and if left in the heater decreased the burning time. Oils with a paraffine base are to be preferred to those having an asphalt base. (4) Bausch and Lomb laboratory thermometers graduated to 300 degrees were used in this work. Two certified thermometers were used to test these at 32 degrees. At least one thermometer per acre should be used and should be tested each season. A thermometer with a long cylindrical

bulb and graduated to 120 degrees is the best. The round bulb type is not sensitive enough. (5) Two types of heaters were used—the Bolton orchard heater of the lard pail type with a capacity of one gallon and the Troutman heater with a center draft and holding five quarts. These were both made of light sheet iron and cost about twenty cents each. (6) The local branch of the United States Weather Bureau, the telephone companies and frost alarms are all used to warn the fruit growers when the temperature reaches the danger point. Some patent alarms are used, but cannot be depended upon entirely. (7) Storage tanks of three types, cement, galvan-

ized iron and wood are used. The latter are of little value. Cement tanks are best for large amounts of oil and for use where they can be placed on the ground. Galvanized iron tanks are good where small amounts of oil are stored, and are especially valuable where it is necessary to elevate the tank. (8) At 30 degrees outside temperature no increase was obtained with 20 heaters per acre. With 39 Troutman heaters per acre an average increase of 1 degree was obtained. The same heaters gave an increase of 3½ degrees with 100 heaters per acre, arranged 17 by 25 feet, and 4.1 degrees when arranged 21 by 21 feet. The Bolton heater with the carbon arrester gave an average of 1.3 degrees with 100 heaters per acre and arranged 17 by 25 feet, and without the arrester gave an average of 4 degrees. (9) The Troutman heaters gave an average burning time of five and one-half hours with five quarts of oil and four and one-half hours with four quarts of oil. There was some trouble with a residue with these heaters. The Bolton heaters averaged four and one-quarter hours with four quarts of oil without the carbon arrester and eight hours with the attachment. One quart of 20 to 30-degree distillate will burn for one hour with these heaters under most conditions. (10) The average cost per acre for a four-hour period is \$5.10 for oil, not counting the equipment, and for wood under the same condition the cost would be \$5.40, as more labor is required. Oil is the best fuel, as less help is required and an even temperature may be maintained. Oil should be handled by a gravity system so far as possible. (11) Under the conditions experienced this season there is absolutely no doubt but that a crop can be saved by orchard heating. A very good example was furnished by the block of apples where the rows that were heated have a crop and the farther away the trees were from the heated area the less fruit was saved. D'Anjou pears showed a slight injury from a late frost, indicating that they were more susceptible to injury than other varieties. Winter Nelis pears did not set a good crop, but that is probably due to weather conditions and not the effect of frost or smudging. (12) The effect of the low temperatures in the Willamette Valley indicates that no arbitrary table of temperatures for frost injury has been worked out for all conditions. The temperature dropped below 29 degrees on several nights and as low as 25 degrees at one time, and was below 28 for more than two hours. A fair crop of fruit is left. The early varieties of strawberries were injured the most.

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## NORTHWEST GROWERS' UNIONS AND ASSOCIATIONS

WE publish free in this column the name of any fruit growers' organization. Secretaries are requested to furnish particulars for publication.

### Oregon

Eugene Fruit Growers' Association, Eugene; Ashland Fruit and Produce Association, Ashland; Hood River Fruit Growers' Union, Hood River; Hood River Apple Growers' Union, Hood River; Grand Ronde Valley Fruit Growers' Union, La Grande; Milton Fruit Growers' Union, Milton; Douglas County Fruit Growers' Association, Roseburg; Willamette Valley Prune Association, Salem; Mosier Fruit Growers' Association, Mosier; The Dalles Fruit Growers' Union, The Dalles; Salem Fruit Union, Salem; Albany Fruit Growers' Union, Albany; Coos Bay Fruit Growers' Association, Marshfield; Estacada Fruit Growers' Association, Estacada; Umpqua Valley Fruit Growers' Association, Roseburg; Hyland Fruit Growers of Yamhill County, Sheridan; Newburg Apple Growers' Association, Newburg; Dufur Valley Fruit Growers' Union, Dufur; McMinnville Fruit Growers' Association, McMinnville; Coquille Valley Fruit Growers' Union, Myrtle Point; Stanfield Fruit Growers' Association, Stanfield; Oregon City Fruit and Produce Association, Oregon City; Lincoln County Fruit Growers' Union, Toledo; Rogue River Fruit and Produce Association, Medford; Mount Hood Fruit Growers' Association, Sandy; Northeast Gaston Farmers' Association, Forest Grove; Dallas Fruit Growers' Association, Dallas; Northwest Fruit Exchange, Portland; Springbrook Fruit Growers' Union, Springbrook; Cove Fruit Growers' Association, Cove; Santiam Fruit Growers' Association, Lebanon; Washington County Fruit Growers' Association, Hillsboro; Benton County Fruit Growers' Association, Corvallis; Sutherland Fruit Growers' Association, Sutherlin.

### Washington

Kennewick Fruit Growers' Association, Kennewick; Wenatchee Fruit Growers' Union, Wenatchee; Puyallup and Sumner Fruit Growers' Association, Puyallup; Vashon Island Fruit Growers' Association, Vashon; Mt. Vernon Fruit Growers' Association, Mt. Vernon; White Salmon Fruit Growers' Union, White Salmon; Thurston County Fruit Growers' Union, Tumwater; Bay Island Fruit Growers' Association, Tacoma; Yakima Valley Fruit and Produce Growers' Association, Granger; Buckley Fruit Growers' Association, Buckley; Lewis River Fruit Growers' Union, Woodland; Yakima County Horticultural Union, North Yakima; White River Valley Fruit and Berry Growers' Association, Kent; Lake Chelan Fruit Growers' Association, Chelan; Zillah Fruit Growers' Association, Toppenish; Kiona Fruit Growers' Union, Kiona; Mason County Fruit Growers' Association, Shelton; Clarks-

ton Fruit Growers' Association, Clarkston; Walla Walla Fruit and Vegetable Union, Walla Walla; The Ridgefield Fruit Growers' Association, Ridgefield; Felida Prune Growers' Association, Vancouver; Grandview Fruit Growers' Association, Grandview; Yakima Valley Fruit Growers' Association, North Yakima; Southwest Washington Fruit Growers' Association, Chehalis; The Touchet Valley Fruit and Produce Union, Dayton; Lewis County Fruit Growers' Association, Centralia; The Green Bluffs Fruit Growers' Association, Mead; Garfield Fruit Growers' Union, Garfield; Goldendale Fruit and Produce Association, Goldendale; Spokane Inland Fruit Growers' Association, Kelisling; Elma Fruit and Produce Association, Elma; Granger Fruit Growers' Association, Granger; Cashmere Fruit Growers' Union, Cashmere; Stevens County Fruit Growers' Union, Myers Falls; Dryden Fruit Growers' Union, Dryden; White Salmon Valley Apple Growers' Union, Underwood.

### Idaho

Southern Idaho Fruit Shippers' Association, Boise; New Plymouth Fruit Growers' Association, New Plymouth; Payette Valley Apple Growers' Union, Payette; Parma-Roswell Fruit Growers' Association, Parma; Weiser Fruit and Produce Growers' Association, Weiser; Council Valley Fruit Growers' Association, Council; Nampa Fruit Growers' Association, Nampa; Lewiston Orchard Producers' Association, Lewiston; Boise Valley Fruit Growers' Association, Boise; Caldwell Fruit Growers' Association, Caldwell; Emmett Fruit Growers' Association, Emmett; Twin Falls Fruit Growers' Association, Twin Falls; Weiser River Fruit Growers' Association, Weiser; Fruit Growers' Association, Moscow.

### Colorado

San Juan Fruit and Produce Growers' Association, Durango; Fremont County Fruit Growers' Association, Canon City; Rocky Ford Melon Growers' Association, Rocky Ford; Plateau and Debeque Fruit, Honey and Produce Association, Debeque; The Producers' Association, Debeque; Surface Creek Fruit Growers' Association, Austin; Longmont Produce Exchange, Longmont; Manzanola Fruit Association, Manzanola; Delta County Fruit Growers' Association, Delta; Boulder County Fruit Growers' Association, Boulder; Fort Collins Beet Growers' Association, Fort Collins; La Junta Melon and Produce Company, La Junta; Rifle Fruit and Produce Association, Rifle; North Fork Fruit Growers' Association, Paonia; Fruita Fruit and Produce Association, Fruita; Grand Junction Fruit Growers' Association, Clifton; Palisade, Grand Junction; Palisade Fruit Growers' Association, Palisade; Peach Growers' Association, Palisade; Colorado Fruit and Commercial Company, Grand Junction; Montrose Fruit and Produce Association, Montrose; Hotchkiss

## CLUB ANNOUNCEMENT

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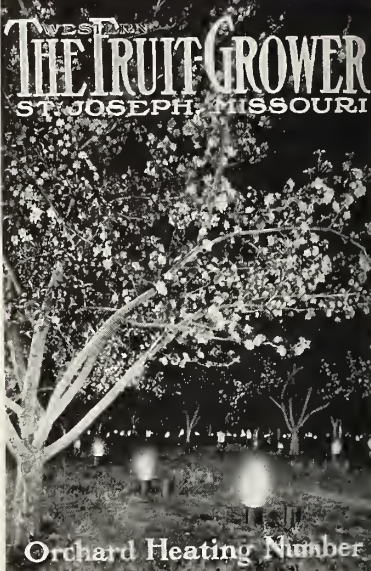
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### Montana

Bitter Root Fruit Growers' Association, Hamilton; Missoula Fruit and Produce Association, Missoula.

### Utah

Farmers and Fruit Growers' Forwarding Association, Centerville; Ogden Fruit Growers' Association, Ogden; Brigham City Fruit Growers' Association, Brigham City; Utah County Fruit & Produce Association, Provo; Willard Fruit Growers' Association, Willard; Excelsior Fruit & Produce Association, Clearfield (Post-office Layton R. F. D.); Centerville Fruit Growers' Association, Centerville; Bear River Valley Fruit Growers' Association, Bear River City; Springville Fruit Growers' Association, Springville; Cache Valley Fruit Growers' Association, Wellsville; Green River Fruit Growers' Association, Green River.

### New Mexico

San Juan Fruit and Produce Association, Farmington.

### British Columbia

British Columbia Fruit Growers' Association, Victoria; Victoria Fruit Growers' Exchange, Victoria; Hammond Fruit Association, Ltd., Hammond; Hatzie Fruit Growers' Association, Hatzie; Western Fruit Growers' Association, Mission; Mission Fruit Growers' Association, Mission; Salmon Arm Farmers' Exchange, Salmon Arm; Armstrong Fruit Growers' Association, Armstrong; Okanagan Fruit Union, Limited, Vernon; Kelowna Farmers' Exchange, Limited, Kelowna; Summerland Fruit Growers' Association, Summerland; Kootenay Fruit Growers' Union, Limited, Nelson; Grand Forks Fruit Growers' Association, Grand Forks; Boswell-Kootenay Lake Union, Boswell; Queens Bay Fruit Growers' Association, Queens Bay; Kaslo Horticultural Association, Kaslo; Creston Fruit and Produce Exchange, Creston.





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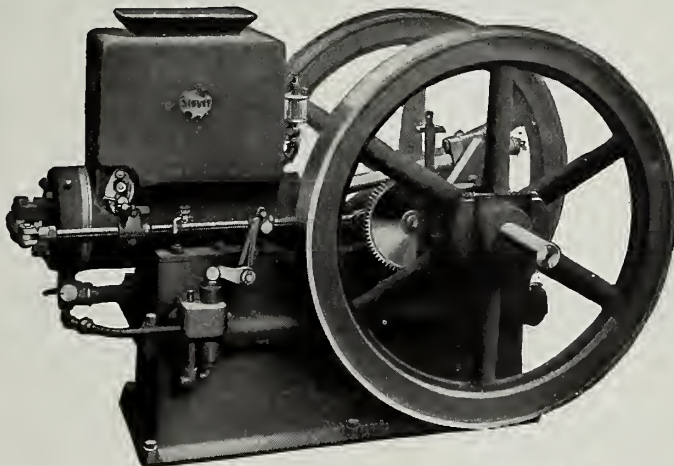
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PORTLAND, OR.  
SPOKANE, WN.  
BOISE, IDA

**Mitchell**  
LEWIS & STOVER CO.

Implements  
Vehicles

Mitchell, Lewis & Stover Co. A5  
Portland, Oregon:

Here is my name for your latest STOVER ENGINE CATALOGS.

NAME.....

ADDRESS.....

USE  
THE SLIP



## "TRUE-TO-NAME"

Grafted & Seedling Walnuts, Grapevines

We have the largest and finest assortment of all the finest French and English walnuts ever grown. Our grape vines are fine strong plants, well rooted, and include the commercial table and shipping grapes, as well as raisin and wine.

In addition to this we have the most complete line of fruit trees, ornamental stock and roses on the Pacific Coast. We make a study of what is suitable to plant in the interior valleys, the coast counties or the foothill regions. We have been growing nursery stock in California for over 28 years, and you will find that it pays to write us what your requirements are and secure our suggestions, as well as prices.

There is a greater call for fruit trees of all descriptions this season than has been experienced in years—therefore it is urgent that orders be placed

NOW

## CATALOGUE SENT FREE

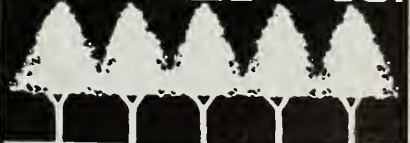
Write for our illustrated price catalogue, which contains brief descriptions of all our stock, including many new varieties, Burbank's latest creations, etc.

"California Horticulture" describes over 2,000 varieties of trees and plants, contains many valuable suggestions about planting, pruning, etc., profusely illustrated, containing 120 pages, will be mailed on receipt of 25c in stamps.

PAID UP CAPITAL \$200,000.00

**FANCHER CREEK NURSERIES**  
GEO. C. ROEDING-PRES. AND MGR.  
Box 10 Fresno, California

**RICHLAND NURSERY CO.**



## ROOT INSURANCE

Is the basis upon which we sell to our customers. Our trees and plants are selected strains with the perfect roots and tops so difficult to procure.

## WRITE FOR CATALOG

46 pages of instruction and information

Every tree we ship to you is guaranteed by us to be true to name and specially adapted to the Pacific Northwest. We sell every variety of Fruit and Ornamental Trees, Berry Plants, Vines, Shrubs, Perennials, Roses, etc. For prompt shipment order from RICHLAND NURSERY CO., INC.

**RICHLAND, WASH**





HERE'S a simple, strong, low-priced light-draft riding harrow which covers more surface with less draft than any other cultivator made. It works **right up to the trees and under lowest branches** without harming fruit or leaves in the least.

## Forkner Light Draft Harrows


*for Orchards and Vineyards*

make it possible to thoroughly cultivate 20 to 30 acres per day with two horses. They lift and turn the soil and leave it in slight waves, thus exposing more surface to the chemical action of the sun and rain. They make a perfect dust-mulch, which conserves maximum amount of moisture.

Write for Free Trial Offer—and Booklet.

We will ship to responsible parties on 30 days' riskless free trial. Free booklet, "Modern Orchard Tillage," tells the whole story.

**LIGHT DRAFT HARROW CO.**  
901 E. Nevada St., Marshalltown, Ia.



### AN ELECTRIC LIGHT PLANT For Your Country Home

Perfect Light and Reliable Service is Given by Our **COMPLETE ELECTRIC LIGHT OUTFITS** 8, 15 and 30 Lamps. Combination Dynamo-Storage Battery Type for the electric lighting of ranches, country homes, stables and factories.

### Make Your Own Electricity

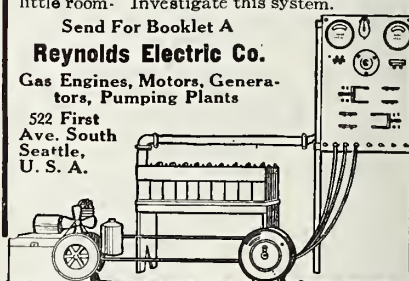
Pure White 16-Candle-Power Light

With this system you generate electric current by the means of a small gasoline engine driving a dynamo or generator at any convenient time. The current is run into a storage battery so you can have light anytime by turning on a switch. Charging of the storage battery is done once or twice a week, or whenever the engine is being run for other work.

No skilled electrician needed to install or run it. Automatic switchboard. Guaranteed. Inexpensive—first cost as well as upkeep. Very simple, perfectly safe, takes up very little room. Investigate this system.

Send For Booklet A

**Reynolds Electric Co.**  
Gas Engines, Motors, Generators, Pumping Plants  
522 First Ave. South  
Seattle, U. S. A.



Faculty Stronger Than Ever  
More Progressive Than Ever

Results Better Than Ever  
Attendance Larger Than Ever

ATTEND THE BEST

# Behnke-Walker College

Business College

PORTLAND, OREGON

## BUTTE POTATO & PRODUCE CO.

BUTTE, MONTANA

Jobbers of All Farm and Orchard Products

We have a large outlet for fruits and vegetables. We want to hear from shippers.

A. J. KNIEVEL, President and Manager  
Sixteen years' experience on the Butte market.

## LINDSAY & CO. LTD.

Wholesale Fruits

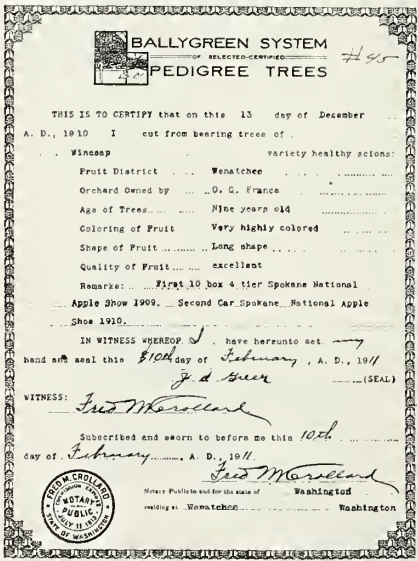
HELENA, MONTANA

Established in Helena Quarter of a Century

Branch houses: Great Falls, Missoula and Billings, Montana

# Pedigree Trees

Facsimile of affidavit on file at Ballygreen.  
Similar one on file for each variety Pedigreed.



**BALLYGREEN SYSTEM PEDIGREE TREES**

THIS IS TO CERTIFY that on this 13 day of December A. D., 1910 I cut from bearing tree of ...

Winecup variety healthy scions:

Fruit District ... Wenatchee  
Orchard Owned by ... O. G. France  
Age of Trees ... Five years old  
Coloring of Fruit ... Very highly colored  
Shape of Fruit ... Long shape  
Quality of Fruit ... excellent

Remarks: ... First 10 box 4 tier Spokane National  
Apple Show 1909. ... Second Car Spokane National Apple Show 1910.

IN WITNESS WHEREOF I have hereunto set my hand and seal this 13th day of February, A. D., 1911

WITNESS: *J. d. Blair* (SEAL)

Subscribed and sworn to before me this 10th day of February, A. D., 1911

*J. d. Blair* Washington

Notary Public and for the state of Washington

IT is a decided advantage to planters to secure Nursery Stock propagated from the finest prize winning trees in the West. Quality and Pedigree certified under affidavit. The Ballygreen System makes this possible.

OUR trees have the well-balanced roots and tops that skilled horticulturists aim to secure.

Such trees produce fruit of quality.

We grow exclusively selected Trees of Certified Pedigree.

Descriptive Pedigree Book and Price List sent on request. Write us.

## Ballygreen Nurseries, Hanford, Wash.

Reliable agents wanted for uncovered territory.



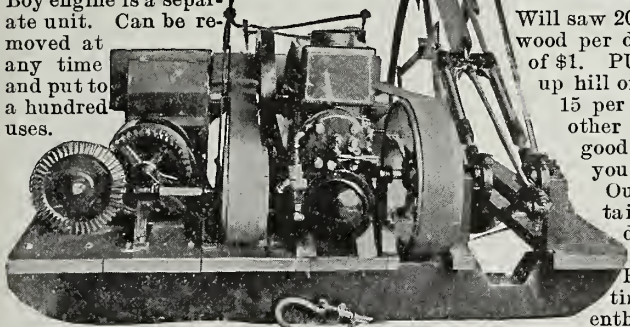
## \$20 per day Earning Capacity

Will Pay for Itself in Less Than Three Weeks. Operated by One Man.

Neat, Compact, Simple, Strong, Light, Durable

The 4 h. p. Waterloo Boy engine is a separate unit. Can be removed at any time and put to a hundred uses.

## "King of the Woods" Drag Saw



Will saw 20 to 40 cords of wood per day at a cost of \$1. PULLS ITSELF up hill or down. Costs 15 per cent less than other makes not as good. There's more you ought to know. Our catalog contains complete description and prices: sent FREE with testimonials from enthusiastic users.

ASK FOR CATALOG C 5

**Reiersen Machinery Co.** PORTLAND, OREGON  
SOLE MANUFACTURERS

## Unvarnished, Cashable Facts About Poultry Profits

If there ever was a straight-from-the-shoulder statement of facts, you'll find it in JOEL M. FOSTER'S book "THE MILLION EGG FARM."

Mr. Foster owns the famous Rancocas Poultry Farm, and in his book he tells his methods for producing upward of *eleven hundred thousand eggs a year*, and piling up a clean annual profit of close to \$20,000.00.

We *know* that the statements in this book are cold facts—because we proved them before publishing

## "The Million Egg Farm"

We have sold many thousand copies of this book, and we *know*, from the actual experiences of those who have read and followed it, that these facts can be profitably applied by *you*—whether you have a dozen hens on a back lot, or number your fowls by the thousands.

Up in Scranton, Pa., a clerk, Robert Liddle by name, read this book, followed its directions, and at last reports was cleaning up \$17.00 a day profit on eggs.

In the light of such experiences, we *know* that farmers need this book. That's why we published it and are trying to put it into the hands of every poultry owner.

To *serve* the farmer is the whole purpose of FARM JOURNAL. To serve him with sound advice regarding every branch of farm work.

To enable him to profit by the labor-saving and money-making discoveries of other farmers. To serve the farmer's wife with helpful housekeeping suggestions. To serve the farmer and his entire family with clean, wholesome entertainment.

Upward of four million readers welcome its monthly visits.

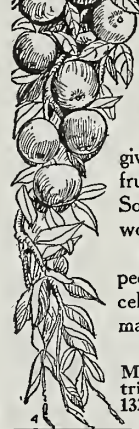
*You need* this paper and *you need* the MILLION EGG FARM book, and you can have

*Farm Journal every month for four years and "The Million Egg Farm" at once, postpaid, for only \$1.00*

Do yourself and family the favor of sending in the dollar to-day.

FARM JOURNAL, 263 N. Clifton St., Philadelphia

## Where Apples Thrive and Pay



Lands in the Southeast, costing from \$15 to \$50 an acre, net profits on apples ranging from \$100 to \$500 an acre.

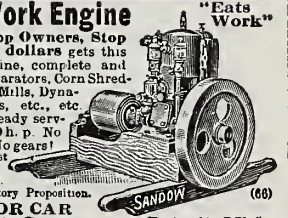
Abundant rainfall and special soils give color and flavor unequalled by fruit grown in any other climate. One Southern tree last year yielded \$124 worth of apples; another tree \$57. Peaches, pears, plums, berries and pecan nuts yield prolifically. Excellent transportation to profitable markets.

Write for full particulars to  
M. V. RICHARDS, Land & Industrial Agt, Southern Ry., Room 13  
1320 Penn. Ave., Washington, D.C.

## Let SANDOW Run It!

### Wonderful Work Engine

Farmers and Shop Owners, Stop Swearing! A few dollars gets this grand little work engine, complete and ready to run Cream Separators, Corn Shreders, Grist Mills, Feed Mills, Dynamos, Printing Presses, etc., etc. Gives a lifetime of steady service! All Sizes: 2 to 20 h. p. No cranking! No cams! No gears! Only 3 moving parts. Finest construction. Thousands in use. Guaranteed 5 years. Write for special introductory Proposition.



DETROIT MOTOR CAR SUPPLY CO., 238 Canton Ave., Detroit, Mich.

## COOPER'S SPRAY FLUIDS

### Read what Hood River says

Hood River, Oregon, Nov. 27, 1909. This is to certify that I have used Cooper's Tree Spray Fluids, V1, for killing San Jose scale and found it very effectual.

G. R. Castner, County Fruit Inspector.

### APTERITE

THE SOIL FUMIGANT DESTROYS INSECTS IN THE GROUND

REDUCES LOSSES SAVES PROFITS IT WILL PAY YOU TO INVESTIGATE Write for 1910 booklet (32 pages)

Testimony from fruit growers everywhere

Agent:

C. G. ROBERTS

247 Ash Street Portland, Oregon

Sole Manufacturers:

William Cooper & Nephews  
CHICAGO, ILLINOIS



# CREATION



The tone is the Jewel.  
The case is the Setting.  
The combination is the  
Steinway—the Perfect  
Piano.

**H**E who is blessed with the power to create is blessed with God's greatest gift to man, and if he uses that power to increase the happiness of his fellow men he becomes a benefactor to the human race.

The world owes homage to the men who have devoted their burning energies to the consummation of one purpose, to the final and most perfect development of an ideal.

## THE STEINWAY PIANO

Is an example of the grand result of years of persistent, purposeful striving after the very highest musical ideal. Sons have taken up the task where fathers left off, so that alternate generations of genius, working through the finest piano factory in the world, have evolved the Steinway—a piano that has long since been acknowledged the musical masterpiece of the ages.

Priced at \$575, \$625, \$775 and up to \$1,600. Of course you can buy a piano cheaper, but it will be a cheaper piano. Why not get the best?

VICTOR TALKING  
MACHINES and  
SHEET MUSIC

**Sherman & Co.**

SIXTH AND MORRISON  
PORTLAND, OREGON

Exclusive Steinway Representatives

### ARE YOUR CROP YIELDS SATISFACTORY?

They are certainly not what they would be if you used Clark's Double Action "Cutaway" Harrow. It requires thorough cultivation to make the soil fertility available for your crops. "Thorough Cultivation," and "Clark's Double Action 'Cutaway' Harrow" are synonymous. The entire machine is made of steel and iron, except the pole, which is jointed so that there is no weight upon the horses' necks, and can be removed in one minute and used as a tongueless, as shown in cut. This is a big feature in moving from field to field, insuring safety to horses. The disks are of cutlery steel, shaped and forged in our own shops, where the only genuine "Cutaway" disks are made. The Double "Cutaway" does twice as much as an ordinary disk harrow and better at the same cost. The inflexible frame holds the gangs rigidly in their places, and compels them to cut high, hard ridges, carrying the soil into the hollows and leaving the ground level. With the flexible or tandem harrows the gangs conform to the surface and do not cut and level the hard, irregular places. Clark's stir every inch, leaving a finely pulverized seed bed. By setting the inner gangs straight on sharp turns, the Disk turns easily, leaving the ground even. No interlocking of gangs.

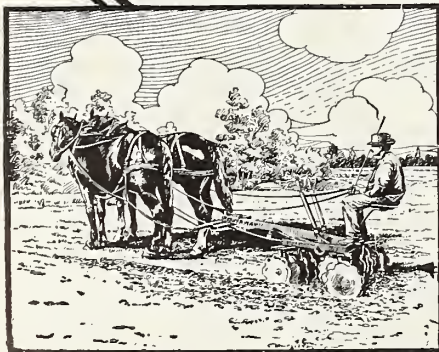
Modern farmers disk before they plow their land. It puts fine soil in the bottom of the furrow, where otherwise would lie loose clods that make a strata through which the sub-moisture can not rise. For this no other disk equals Clark's.

#### What Prof. Bailey Says:

"The Double Action 'Cutaway' Harrow has been satisfactory. I use it almost continuously on our hard clay land with good results."

If your dealer can't supply the genuine "Cutaway," write us. Satisfaction guaranteed. Twenty-five years' experience back of every sale. Prompt Shipments. Get our booklet "Intensive Cultivation." It's free. We make a special tool for every crop.

**CUTAWAY HARROW CO.**  
940 Main St., Higganum, Conn.

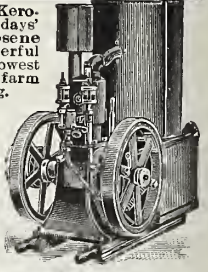


## Use KEROSENE Engine FREE!

Amazing "DETROIT" Kerosene Engine shipped on 15 days' FREE Trial, proves kerosene cheapest, safest, most powerful fuel. If satisfied, pay lowest price ever given on reliable farm engine; if not, pay nothing.

### Gasoline Going Up!

Automobile owners are burning up so much gasoline that the world's supply is running short. Gasoline is 9c to 15c higher than coal oil. Still going up. Two pints of coal oil do work of three pints gasoline. No waste, no evaporation, no explosion from coal oil.



## Amazing "DETROIT"

The "DETROIT" is the only engine that handles coal oil successfully; uses alcohol, gasoline and benzine, too. Starts without cranking. Basic patent—only three moving parts—no cams—no sprockets—no gears—no valves—the utmost in simplicity, power and strength. Mounted on skids. All sizes, 2 to 20 h. p., in stock ready to ship. Complete engine tested just before cranking. Comes all ready to run. Pumps, saws, threshes, churns, separates milk, grinds feed, shells corn, runs home electric-lighting plant. Prices (stripped), \$29.50 up. Sent any place on 15 days' Free Trial. Don't buy an engine till you investigate amazing, money-saving, power-saving "DETROIT." Thousands in use. Costs only postal to find out. If you are first in your neighborhood to write, we will allow you Special Extra-Low Introductory price. Write! Detroit Engine Works, 507 Bellevue Ave., Detroit, Mich.

### Make Big Money Drilling Wells



**IMPROVED STANDARD DRILLING MACHINE**  
One Man Can Handle  
Has a record of drilling 130 feet and driving casing in one day. Only three levers. Extra large rope sheaves. Positively will drill every kind of formation. Avoid delays from sending back East. Buy from us. We build these up-to-date machines. Will tell you all in catalog. Write for it. REIERSON MACHINERY CO., MANFRS., PORTLAND, OREGON

### The Law Says SPRAY NOW For San Jose Scale

All infected fruit trees one year old and over with lime and sulphur solution."

Sec. 47, Revised Code 1909.

The State Commissioner reports "Ninety-ninths of all fruit is infected and

**THOUSANDS OF BOXES CONDEMNED**  
Annually because of this disease.

## LILLY'S LIME and SULPHUR

Is a scientifically mixed solution endorsed by the State Agricultural College because of its concentrated form. In wet weather use a 2-8 solution; in dry weather 1-11 solution, in December and again in February. Send for Lilly's Spray Book and prices.  
Chas. H. Lilly Company, Seattle, Wash.

### Johnson's Big 1912 Book

That he calls

## "POULTRY SERMONS"

—READY FOR YOU

Send a postal sure this time for Johnson's book—the best and biggest ever in 36 years—hundreds of actual new photographs showing

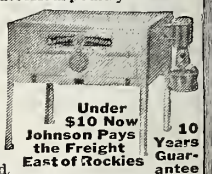
### Old Trusty Incubators

Used by many hundreds of thousands of most successful poultry raisers.

40, 60 or 90 Days' Trial

Under \$10 now, 10 Years' Guarantee.

Johnson pays the Freight east of Rockies, 75 per cent higher freight charges guaranteed.



Under \$10 Now Johnson Pays the Freight East of Rockies 10 Years Guarantee

M. M. JOHNSON (Incubator Man) Clay Center, Neb.



# Use Labels! It Pays

**A GOOD COMBINATION  
AND A WINNER**

**1<sup>ST</sup> GOOD FRUIT  
2<sup>ND</sup> GOOD PACKING  
3<sup>RD</sup> GOOD LABELS**

**THE LABEL HELPS.**

## Schmidt Lithograph Co.

**E. SHELLEY MORGAN, MANAGER.**

**408 WELLS FARGO BLDG.**

**PORTLAND, OREGON.**

**SAMPLES AND PRICES ON APPLICATION**

## FREE EXPERT ADVICE

By Professor A. Van Holderbeke, five  
years Washington State Horticulturist,

## TO FRUIT GROWERS

Purchasing high grade nursery stock,  
guaranteed true to name, from the

**Van Holderbeke Nursery Company**

Main Offices:  
Columbia Building  
Spokane, Washington

**RELIABLE  
AGENTS  
WANTED**

Nurseries:  
Spokane Valley and  
Kennewick, Washington

## NEW ORLEANS

**GEO. H. APPEL**

**IMPORTERS  
JOBBER**

**Wholesale  
Commission**

The Acknowledged  
FANCY FRUIT HOUSE  
of New Orleans

# LAUX & APPEL

**All Fruits in Season**

**Storage for 50 Cars**

THE HOUSE  
YOU WANT

## BETTER FRUIT

Has no peer in the Northwest

And so we have established

## THE FRUIT JOURNAL

along similar lines in behalf of the  
great irrigated fruit districts of the  
Rocky Mountain region, a com-  
panion paper to this, your favorite  
fruit magazine.

We have made it up-to-date,  
clean, high class editorially, me-  
chanically and pictorially.

The subscription rate is \$1.00 per  
year. It is worth it.

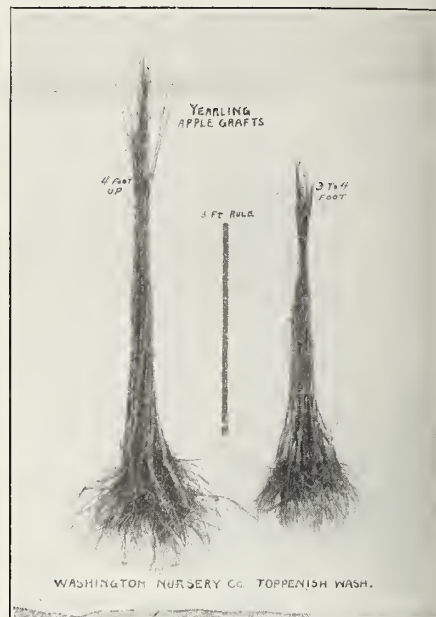
**THE INTERMOUNTAIN  
FRUIT JOURNAL**

**Grand Junction, Colorado**





Eighty-Acre Field of Yearling Grafts, Washington Nursery Co., Fall 1911



Yearling Grafts from this Field, as Shipped November 11

In this field we planted over two million apple grafts in March, 1911, and enough more in adjacent fields to make over three and one-quarter million in all. We had a 75 per cent stand, as shown above, one of the finest sights imaginable, and probably not equaled in its class in the United States.

# Those Are Some of the Trees We Shipped

Read what the customers say. Dozens more letters like these on file:

## TESTIMONIALS

### Washington

Anacortes, Nov. 13, 1911. "This is about as nice a lot of trees that I ever had the pleasure of opening up, and the customers were well pleased with their stock." A. F. Schreiber.

Goldendale, Nov. 15, 1911. "Am well pleased with my trees." E. S. Seitzinger.

Spokane, East 1504 14th Ave., Nov. 14, 1911. "Such a shipment as this 425 Wagener's it is a pleasure to turn over to a man who trusted to me to order for him and select the nursery." Herman Thoeni.

Pasco, Nov. 20, 1911. "The trees came in fine shape and they were more than I expected. The rose bushes were also fine. Thanking you for your courteous treatment." A. R. Byquist.

Orting, Nov. 20, 1911. "I am happy to report to you that everyone without exception who received trees or shrubbery spoke in highest terms of praise and declared it the best lot ever delivered in Orting." J. C. Jacques.

Seattle, 3113 King St., Nov. 18, 1911. "I unpacked the Greenwood box, found everything in good condition, packing perfect, trees fine." Levi Wright.

Ellensburg, Sept. 21, 1911. "Will say that I am well pleased with the stock supplied last spring. You will remember you could not furnish first grade, but sent the best you had. Stock has made a splendid growth." A. E. Gaston.

Walla Walla, Nov. 3, 1911. "The trees, rose bush, one Perfection currant, came yesterday, but we were not aware of the fact until this a. m. However, they were a fine lot of trees, etc., and we feel that every one will grow, as we set them out before 10 o'clock this a. m. We wish to express our thanks for your generosity in the replace. We appreciate the kindness. We have a fine lot of trees from your place." J. R. Phillips.

Pullman, Nov. 6, 1911. "Your shipment has been received and nearly all delivered. Our customers are very much pleased with their orders, declaring them to be the best trees ever received at this point."

### Oregon

Hermiston, Nov. 13, 1911. "The patrons here were uniformly well pleased with their stock; it is the finest I have ever seen in twenty-five years' experience in the nursery business, and its superb, clean quality will impress confidence upon every grower who has seen or used it." C. L. Swain.

Huntington, Nov. 14, 1911. "I am pleased with the trees sent me for delivery, and all that were there when consignment arrived said they were the finest lot of trees they had ever seen, delivered and packed." C. J. Hanson.

Dundee, Nov. 15, 1911. "Please find enclosed postal order for \$9.28 for my trees. They are all O. K. Am well pleased with them." J. M. Shutt.

Forest Grove, Nov. 15, 1911. "I have just unpacked the trees you sent and they appear in splendid condition." Charles Roper.

Baker, Nov. 15, 1911. "The stock is in good condition, the packing first class." David Kelley.

### Idaho

Caldwell, Nov. 20, 1911. "Each customer was well pleased with the nursery stock sent them and I wish to thank you for them also for myself for filling the order with what I call first-class stock." J. E. Bird.

Moscow, Box 677, Oct. 17, 1911. "Of the 600 trees I bought from your Mr. Perry in Spokane last fall and which were delivered to me this spring, will say that they did some remarkable growing. In fact, some grew more than I would like to have had them grow. Rome Beauties and Spitz grew 28 inches." Wm. Buchholz.

Cataldo, Nov. 4, 1911. "Nursery stock received yesterday; was in fine condition." W. I. French.

### California

Bogus, Oct. 23, 1911. "Have had good success with your trees we ordered through your agent in this locality." Jones Bros.

### WE WANT YOUR BUSINESS

We grow all sorts of *Fruit, Shade and Ornamental Stock*. It's our business to grow good trees and to pack and deliver them properly. We want your business. Write us.

# Washington Nursery Co.

TOPPENISH, WASHINGTON



Always room for more good salesmen. Write us for particulars



# ANYTHING IN SHEET STEEL



STEEL PIPES SAVE WATER

STEEL PIPES SAVE LABOR

**YOU DO NOT HAVE TO WAIT FOR STEEL PIPES TO  
"SOAK UP" AND THEY LAST INDEFINITELY**

WE MANUFACTURE

Galvanized Steel Pipe

Storage Tanks

Galvanized Steel Culverts

Pressure Tanks

Asphaltum Coated Pipe

Steel Flumes

Columbia Hydraulic Rams

**COLUMBIA ENGINEERING WORKS, Portland, Oregon**



## THE RESULT

OF YOUR YEARS OF STUDY, WAITING  
LABOR AND INVESTMENT

### Depends on the Trees You Plant

All trees are not alike, as some people erroneously suppose. They differ in vigor of constitution. This regulates their ability to transplant successfully; to make a good growth the first year in your orchard (which is the critical period), to commence early bearing, to perfectly mature their fruit. In short, it means success or failure to you.

Orenco trees are succeeding from Southern California to Northern British Columbia. Why?

Because they have a strong, rugged constitution.

Plant Orenco trees and get results. Address

**OREGON  
NURSERY COMPANY  
ORENCO, OREGON**

The result of planting Orenco's dependable, profitable trees.  
What kind are you going to plant?



# To Fruit Growers of the Northwest

**T**HE HOUSE of STEINHARDT & KELLY, New York, take great pleasure in advising the Fruit Growers of the Northwest that they have again acquired on a purchase basis large blocks of their products consisting mainly of Apples and Pears. No concern in the East has so consistently used its best efforts on behalf of the Growers of the Northwest, and we herewith desire to thank them for their co-operation in giving us their support by putting up the most magnificent pack of fruit the East has ever seen.

Particularly do we desire to commend the Growers of the Hood River Valley of Oregon, the Wenatchee Valley of Washington, the Bitter Root Valley of Montana, the Mosier Valley of Oregon and among individual packers and shippers the Wenatchee Produce Company of Wenatchee.

## Steinhardt & Kelly

101 PARK PLACE, NEW YORK

The Most Extensive Operators in High Class Fruits in the World  
Purveyors to the Most Discriminating and Exacting Clientele  
Direct Connections in all the Leading Markets of the United States and Europe